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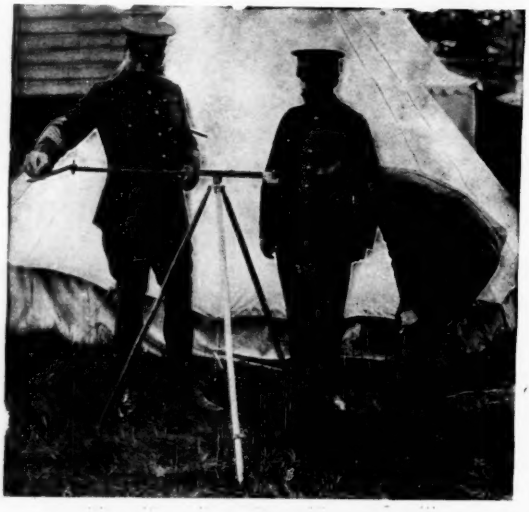

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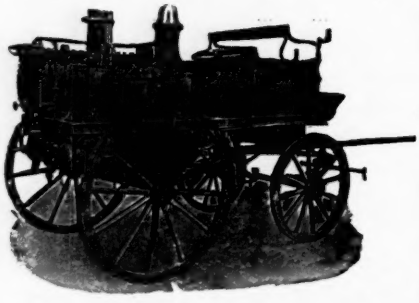

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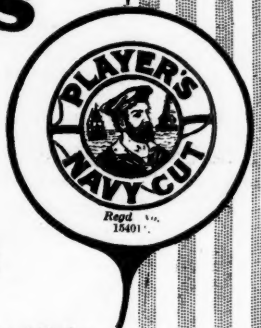

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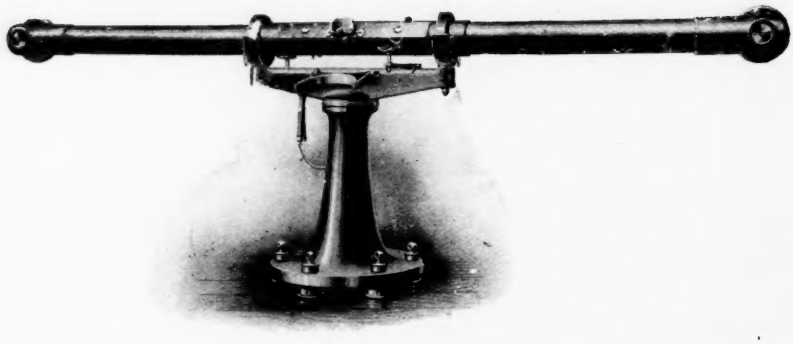

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F.R. TYPE. 15 FT. BASE.
ON NAVAL MOUNTING.

For Use on Large Battle-ships and Cruisers, and for Coast-defence work.

Fitted with a brake for controlling the Rangefinder in azimuth in a sea-way.

Approximate uncertainty of observation:—

2	yards	at	2,000
18	,,	,,	6,000
50	,,	,	10,000
120	,,	,,	15,000

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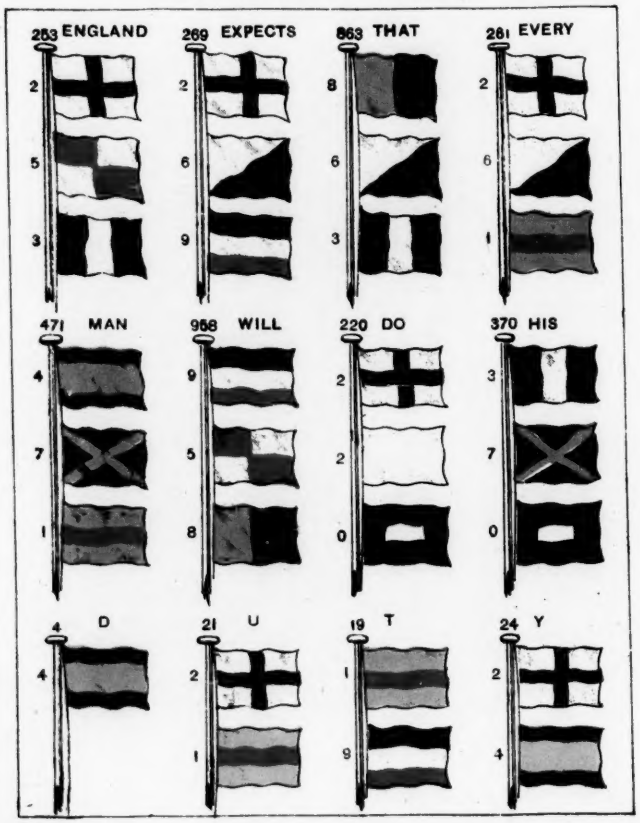
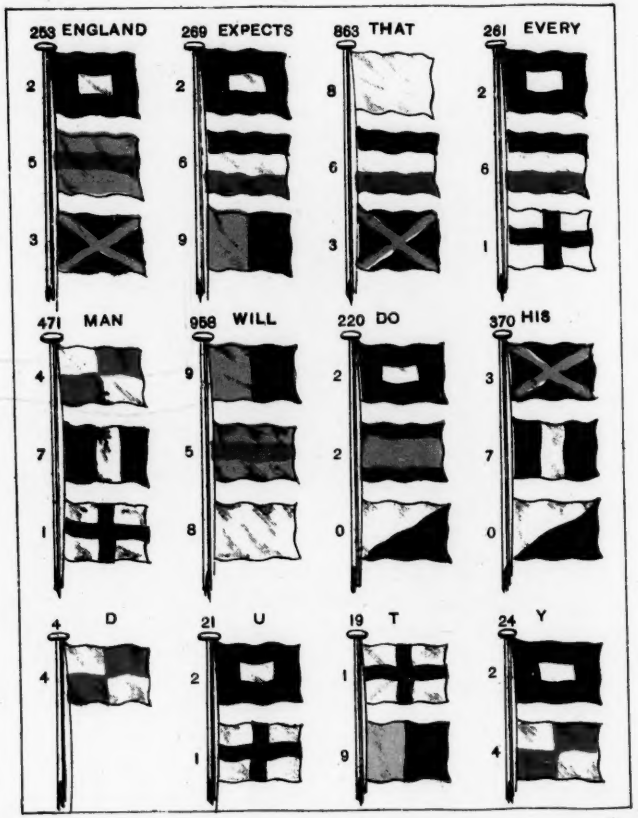
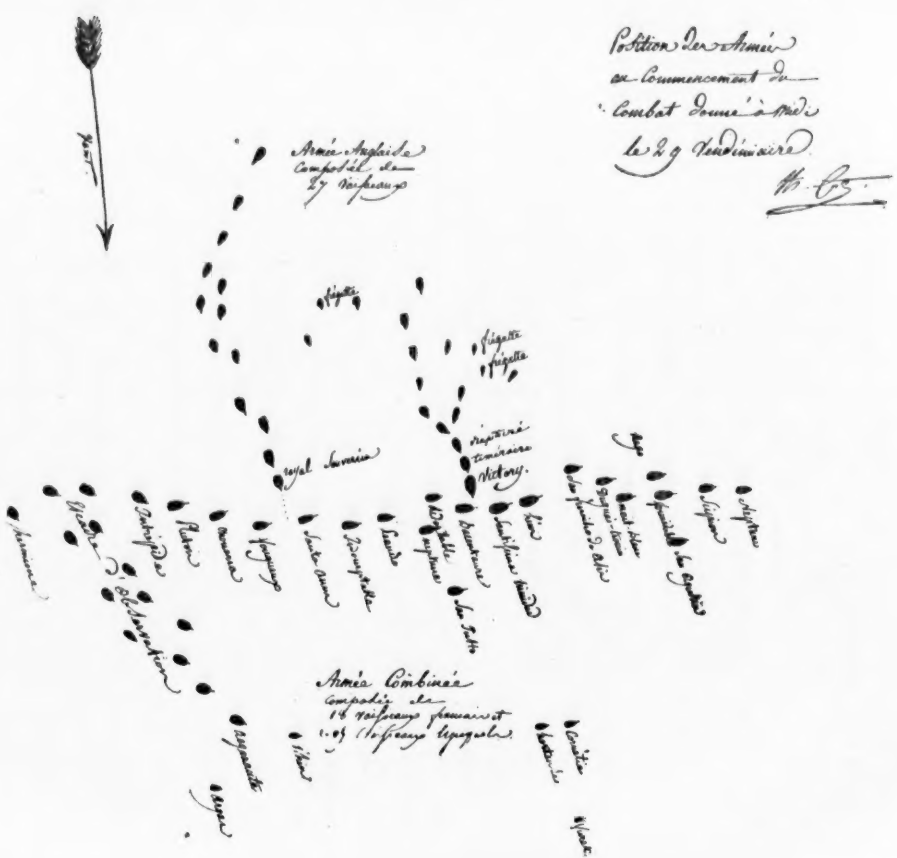
LORD NELSON'S SIGNAL AS IT HAS BEEN INCORRECTLY EXHIBITED.



THE CORRECT REPRESENTATION OF THE HISTORIC SIGNAL.




Position des Armées
au Commencement du
Combat donné à midi
le 29 Vendémiaire
Armée Anglaise
Composée de
29 Vaisseaux
Victory.
royal Sovereign
Armée Combinée
Composée de
18 Vaisseaux français et
(29) Vaisseaux Espagnols

FACSIMILE OF A LETTER FROM A FRENCH NAVAL OFFICER DESCRIBING THE BATTLE OF TRAFALGAR, WITH A SIGNED PLAN SHOWING THE DISPOSITION OF THE TWO FLEETS AT NOON ON THE DAY OF THE BATTLE.

Relation du Combat livré le 29 Vendém.re an 14 (21 octobre 1805) entre l'armée combinée aux ordres de l'amiral Villeneuve, et celle anglaise aux ordres de l'amiral Nelson.

Le 28 à 11.h du matin toute l'armée combinée aux ordres de l'amiral Villeneuve a mis à la voile de la Rade de Cadix avec un vent de Sud au SSO assez grand frais et a couvert la Division.te qui avait resté la veille aux ordres du general Magon s'est ralliée à elle

» l'algesiras
» le neptune
» le Heros
» le Duguay-Trouin
» l'achille
» l'argonaute
» le Bahama

Le matin à 7.h le V.ce le Hr nous signala 18 Voiles dans la Rade et deux Frégates anglaises plus approchées de la Div.on Observant ses mouvements

Le vent du SSO variable jusqu'au ONO bon frais le Tems couvert et pluvieux avec apparence de coup de vent

à 1.h 30 après midi, l'amiral fit à l'armée le signal de rallier et ensuite celui de former l'ordre de trois Colonnes anglaises Divisions babord amures et contre Divisions bâbord tout à la fois cette seconde Manoeuvre fut ordonné par l'amiral pour rallier les Vaisseaux les plus sous le vent dont la 1.re tenait le 1.er Rang, et le 2.e Rang, fut avancer pour

Les Frégates prenant les mouvements Variaient jusqu'au ONO ce qui nous permit de nous tenir bord à virer jusqu'au SO

Au commencement de la nuit l'armée changea

Sur trois colonnes au plat[ine] pour suivre [illegible] tribord amures
L'escadre d'observation commandée par le
general gravina composée de 12 vaisseaux se
forma sur deux lignes et à la droite de l'armée
à 8 h. du soir un 4me ayant fait le signal
que l'on découvrait des voiles etrangeres à l'armée
l'amiral fit celui de former l'ordre de bataille
[illegible] au rang de victoire [illegible] qui fut executé sur le champ
Pendant toute la nuit les batiments
d'observations de l'ennemi furent de signaux et
l'armée combinée arriverent de lorsque la ligne de
bataille tribord amures
Le 21 à la pointe du jour l'on eut connaissance
de trente deux voiles autres de l'armée combinée
qui arrivaient sur elle avec le vent du No
lorsqu'elles furent rapprochées de l'armée on distingua
7 V.aux à trois ponts 2 de 80 15 de 74 et trois
de 64 quatre frégates et 1 brick
V.e Position
Vers les 8 h du matin la manoeuvre que
firent les ennemis parailloit etre de diriger toutes
leurs forces sur l'arriere garde de l'armée autour
l'amiral Villeneuve fit le signal de virer de bord
lof pour lof tout à la fois ce mouvement fut
executé avec lenteur le vent ayant beaucoup tombé
et permettant à peine de gouverner
à 10 h du Matin les ennemis se formerent
sur trois colonnes ayant à la tête de celle de
droite trois vaisseaux à trois ponts et à celle
de gauche quatre de la même force elles dirigerent
leur route venant du Nord sur deux lignes presque

parallèle et perpendiculaire à celle sur laquelle l'armée combinée était rangée, l'armement alors du N/a NO au N/a NE

2me Position

Le peu de vent qu'il faisait n'permettait pas aux vaisseaux de se placer parfaitement bien en ligne ils étaient par pelotons et n'pouvaient pour cette abordage de n.re ar.re l'armée était dans cette position lorsque le Chef de file de la colonne de droite coupa la ligne à 11.h en arrière du V.au de la V.te amie après que cet V.au eut fait cette Manoeuvre il fut suivi par le second V.au qui le suivait dans la Colonne les autres dirigeant leur route pour couper la ligne d'un d'autre partout

Le 1.er V.au de la Colonne de gauche gouverna à passer à poupe du V.au le Bucentaure monté par l'amiral Villeneuve, le redoutable qui observait son matelot de l'arrière aborda le second Vaisseau anglais (le Temeraire) et l'enyncha d'aller plus avant, mais le premier Vaisseau continua sa route jusqu'au Vaisseau la Trinité le troisième fut se placer à poupe du V.au le Bucentaure et Commencant l'action à la reddition des V.aux le Bucentaure et de la Trinité

a 1.h 1/2 le Bucentaure fut démâté de tous mâts et la V.te Trinité, peu de tems après les autres V.aux de la Colonne de gauche suivant coupe la ligne d'un d'autre partie de l'avant-garde d'un peu d'arrière le V.au anglais français et Espagnole se trouvant tous pêle mêle

l'adresse des canonniers anglais et la supériorité
du matériel de leur artillerie sur celle des forces
combinées fit démâter dès le premier abord
les vaisseaux français et Espagnols avec lesquels
ils combattaient enfin en quatre heures de temps
que dura ce combat il y eut 17 vaisseaux tant
français et Espagnols rasés comme des pontons

Ce qui prouve bien mieux à quel point les
Canonniers français et Espagnols étaient mal
adroits c'est le peu d'avarie qu'éprouvèrent
les deux premiers vaisseaux chefs de file des deux colonnes
anglaises avant que l'ennemi coupât la ligne malgré
le feu que faisait sur chacun d'eux quatre vaisseaux
quand de l'armée

à 5 h l'amiral Espagnol fit le signal
de rallier et les vaisseaux degrées se rallièrent à son
pavillon en faisant route pour Cadix

Deux coups de canon réunissaient l'armée
combinée à l'état suivant

Sauvés	Pris	Coulés	Naufragés
Bucentaure	le S.t Wilhelmine français	l'intrépide	le Fougueux
Neptune	le S.t Jean	le redoutable	l'indomptable
Héros	S.t Adelphonse	la Trinité	Bucentaure
Algésiras	le Bahama	l'argonaute	Berwick
argonaute			
aigle			
français			

		Saint Augustin	Monarca
	Rendu	le formidable	Argo
Prince des asturies	l'achille français	Montblanc	Neptune
la S.te anne		Dugnay Trouin	
le Montagnes		Scipion	
le S.t Justo		S.t augustin	
le Leandre			

THE JOURNAL
OF THE
ROYAL UNITED SERVICE INSTITUTION.

VOL. LII. OCTOBER, 1908. No. 368.

[*Authors alone are responsible for the contents of their respective Papers.*]

SECRETARY'S NOTES.

I. OFFICERS JOINED.

The following officers joined the Institution during the month of September :—

Captain A. L. Godman, Yorkshire Regiment.
Lieutenant T. L. S. Garrett, R.N.R.
J. F. Pett, Esq., late Lieutenant 3rd Battalion East Kent Regiment.
Lieutenant J. P. Nind, R.M.L.I.
Lieutenant G. P. L. Cosens, 1st Dragoons.
Captain W. H. C. Davy, Middlesex Regiment.
Second Lieutenant C. F. A. Walker, Grenadier Guards.
Second Lieutenant W. J. R. Peacocke, Grenadier Guards.
Second Lieutenant H. L. Fletcher, Grenadier Guards.
Sub-Lieutenant H. T. Baillie-Grohman, R.N.
Captain W. H. Williamson, late Manchester Regiment.
Lieutenant A. D. St. G. Bremner, R.E.

II. COUNCIL.

The Council regret to announce the death of Lieut.-Colonel T. H. Baylis, V.D., K.C., a Vice-President of the Institution. Colonel Baylis joined the Institution in 1863, became a member of the Council in 1886, and a Vice-President in 1892.

III. LECTURES.

The Lecture which was announced to be delivered on 4th November by Major C. B. Simonds, R.G.A., on the Anglo-French Niger—Lake Chad Boundary Commission, will not take place, that officer having proceeded to India. His paper, however, will be published in the JOURNAL.

The title of the Lecture to be delivered by Major F. Moloney, R.E., on 25th November, is: "How should London be Defended on Emergency?" and not as previously stated.

Lieutenant-General Sir A. H. Paget, K.C.B., K.C.V.O., will preside at the Lecture to be delivered on 16th December, "The Cycle in Warfare," by Captain A. H. Trapmann, 25th (Cyclists) Battalion The London Regiment.

IV. ARMY PROMOTION LECTURES.

1. Military History.
2. Military Law.
3. Administration and Organisation.

1. A course of ten lectures in Military History on "Grant in Virginia, 3rd May to 30th June, 1864," set for the November Promotion Examination, will be given on Tuesdays and Fridays at 4 p.m., commencing on 13th October, the lecturer being Mr. J. H. Anderson, F.R. Hist. Soc., Barrister-at-Law.

2. A course of eight lectures in Military Law will be given on Mondays and Thursdays, commencing on 19th October, at 4 p.m., the lecturer being Lieut.-Colonél F. J. Tidy.

3. A course of eight lectures in Administration and Organisation will be given on Mondays and Thursdays, at 5.30 p.m., commencing on 19th October, the lecturer being Captain G. P. A. Phillips, R.E. (s.r.)

The fee for attending each course of lectures is one guinea for members of the Institution, and two guineas for non-members.

Applications to attend, enclosing the fee, should be addressed to the Secretary, Royal United Service Institution, Whitehall, S.W.

V. SPECIAL RESERVE AND TERRITORIAL ARMY.

Officers of the above Forces are eligible for membership of the Institution. The Council have had under consideration the alteration of the Bye-Laws owing to the abolition of the Militia and Volunteer Forces, and the creation of the Special Reserve and Territorial Army, and resolutions have been prepared making the necessary alterations. Under the terms of the Royal Charter, all alterations of Bye-Laws must be passed by the Annual General Meeting of the Institution. It is, therefore, not possible to effect the change until that meeting is held. The meeting in question, under the Bye-Laws, takes place on the first Tuesday in March each year.

Officers of the Special Reserve and Territorial Army are informed that it has been found quite impossible to alter the change of designation of their corps and battalions until the Official Army List has been completed in this particular. As soon as this is done, the alterations will be made.

VI. GOLD MEDAL ESSAY.

Officers who are competing for the 1908 Gold Medal are reminded that all Essays must be received not later than 14th November, 1908. The subject of the Essay is: "The Command of the Sea: What is it?"

VII. ADDITIONS TO THE MUSEUM.

1. India-rubber Stamp which formerly belonged to the Orange Free State Government. *Given by K. Campbell-Lester, Esq.*

2. Cap Badge of the 65th Regiment, as worn by the rank and file prior to 1881. *Given by Major E. C. Broughton.*

3. Model of a French Man-of-war of 84 guns of the latter portion of the nineteenth century. The hull of the model is made of bone and is the work of French prisoners of war. The rigging has been carried out by Mr. John Smith (late P.O., 1st Class, R.N.), of the Museum Staff. *Given by Mrs. Brumel.*

4. A Coloured Print, entitled "A View of the British Army," dated 1803, and indicative of the costume of the various regiments of that date. *Given by Sir Guy Fleetwood-Wilson, K.C.B.*

5. Three Coloured Prints by R. Dighton, entitled "The Master-General of the Ordnance" (1819); "A View of a Lake" (Lord Lake) (1818); "A Good Soldier but no General" (Sir Robert Wilson) (1821); being representations in caricature.

6. Two Prints in oils by G. Baxter, 1854, entitled "Review of the Britsh Fleet at Portsmouth, Artillery in the Foreground"; and "Charge of British Troops on the Road to Windlesham, with Chobham Camp in Distance."

7. A Print of the Grand Review which took place in Hyde Park, 9th July, 1838.

8. Five Specimens of Japanese Paper Money used during the war in Manchuria. *Given by Colonel J. A. L. Haldane, C.B., D.S.O.*

9. A Bronze Circular Box bearing Lord Nelson's Portrait on the lid, with inscription: "England's Admiral, Nelson, Duke of Bronte"; also "Hor. Vice-Com. Nelson, *ob patriam pugnando.* Mort. Oct. XXI., MDCCCV." On the base of the box a figure of Victory, ships in the distance, with inscription: "Record of Naval Valour—Every man has done his duty"; also "*ipse belli fulmen.*" The box has as contents twelve finely-executed prints in colour, by Edward Orme, representing:—

   Lord Rodney's Victory, 1782.
   Lord Howe's Victory, 1784.
   Nelson Boarding the *San Josef*, 1797.
   Lord Duncan's Victory, 1797.
   Battle of the Nile, 1798.
   Victory of Copenhagen, 1801.
   Nelson at Trafalgar, 1805.
   Sir R. Strachan's Victory, 1805.
   The Boarding of the *Chesapeake*, 1813.
   Bonaparte on the *Northumberland*, 1815.
   The Bombardment of Algiers, 1816.
   Slaves Delivered at Algiers.

The box with its contents was originally the property of the First Earl of Liverpool, who was Prime Minister in 1812.

Given by C. W. Everard, Esq.

VIII. HONORARY MEMBER.

Mr. W. W. Astor, in consideration of his valuable gifts to the Museum, has been elected an Honorary Member of the Institution; this brings the number of Honorary Members up to eighteen. The privilege is only granted by the Council to persons who have rendered eminent service to the Institution.

THE NECESSITY OF A WAR CHEST IN THIS COUNTRY, OR A GREATLY INCREASED GOLD RESERVE.

By Sir ROBERT GIFFEN, K.C.B., LL.D., F.R.S.

On Wednesday, 25th March, 1908.

Sir FELIX SCHUSTER, Bart., Member of the Council of India and President and Chairman of the Council of the Institute of Bankers, in the Chair.

WHAT has been in my mind in taking up this subject is not the whole question of war chests which belong strictly to the domain of the military and naval expert, viz.: What kind of chest to provide for particular operations, and how? In ordinary times, for modern civilised Governments, which as far as war is concerned, have mainly to do with wars of "limited liability," as they have been aptly called, the arrangements for a military chest are a mere departmental detail of administration.

Even in a comparatively serious war, where the whole expenditure may be large enough to affect the national finances, a war like our own South African war the other day, the mode and means of replenishing the military chest as the war goes on may not be at all a difficult matter, the monetary machinery of the modern State being generally so good.

I desire also to avoid the subject of a special cash reserve to be used in carrying on some war in which the State may be engaged, such as was instituted in Prussia, and which still exists in some form, though it does not seem to have increased of recent years beyond the £6,000,000 at which it was long ago fixed. A reserve of this sort could have made little difference to the Franco-German war, with its enormous outlay, or to any war on a modern scale, such as that between Japan and Russia. Such a reserve may be useful for certain purposes, but could hardly aid directly to a material extent in a formidable contest.

What I desire to bring before you is something different: the difficulty that may and must arise among the leading States should they become engaged in war with each other in a measure that jeopardises the mechanism of credit in the States affected, and throughout the commercial world generally. It appears to me that this is a formidable possibility of the international credit system that has never been adequately considered. And it has not been considered for the simple reason that as a matter

of fact since this system became developed in its modern proportions there has been no war in which the leading nations most important to the system have been mutually involved. The credit system in its full development internationally, with bankers' clearing houses, a general currency of cheques, and a heirarchy of banks dominated, in this country especially, by a single great reserve bank at the top, has lasted little more than half or threequarters of a century in this country and in Germany, the United States, France, and other countries even less. In all this time there has been no war—that is, to be quite accurate, no war of "unlimited liability"—involving most of the leading nations at once, more especially involving the State which possesses the citadel of the credit system—our own. There have doubtless been some most serious wars which disturbed credit more or less—the United States Civil War in 1861-5, the Austro-Prussian war in 1866, the Franco-German war in 1870-71, the Russo-Turkish war in 1878, the Spanish-American war, and the Russo-Japanese war; but in none of these was the working of the international credit system substantially endangered, while our own country—the citadel of the credit system—was fortunately not engaged. We are considering, then, a kind of war of which there has been no real experience, though some of the happenings in the less serious wars referred to were of a nature to excite no small alarm. If these things have been done in the green tree, what shall not be done in the dry?

What would happen now if, for instance, France and Germany, with their allies, were to be again at war, or if the United States and Japan, plus a great European Power, were to be embroiled? Or if *absit omen* this country were itself to be engaged with Germany or the United States, or Russia, with perhaps one or two more States joining in as our allies or enemies? Such a war, it seems to me, would bring upon us, as well as upon the whole community of civilised States to which the system of international credit extends, quite unprecedented calamities and dangers. This would result from the breakdown of the credit system itself and the interruption of international commerce. In past times great injuries to such commerce as existed were due to these causes. One need only refer for illustration to the anticipated effects on the Highland clans of the failure of the house of Osbaldiston, described in Sir Walter Scott's novel of "Rob Roy," and the reaction of a Highland rising on the business and credit of London itself. But nowadays there would be vast indirect as well as direct effects if any important factors in the international circle were to be displaced, still more if two or three great commercial communities were affected by a general suspension of payments. Such and no less are the evils to be anticipated from a breakdown of the international system of credit. The other evils of great wars—the exhaustion of resources, with loss of life, disease, and misery—would remain what they have already been, but in addition there would be these new and formidable evils.

To make the impression more definite we may classify the mischiefs to be anticipated from the outbreak of great wars affecting the leading civilised States. I would mention first of all the stoppage or great contraction of the volume of imports and exports between enemy States and the States dependent on them. Between States actually at war with each other there would of course be stoppage and contraction affecting, as between this country and the United States alone, if we should be at war a direct import of 136 million pounds[1] annually into this country, and a direct export of 60 million pounds,[2] besides 13 million pounds imports and 18 million pounds exports of gold and silver, and an indirect trade of about equal amount in imports from third countries into the United States and exports from the United Kingdom to those third countries which have their ultimate origin in the direct trade. But the stoppage and contraction would extend yet further, the customers of all the countries primarily affected being unable to escape the effect of the losses of those countries. The commotion in the whole banking world would be something quite unexampled. Every month, every week, every day, bills are coming due in the great centres and especially in London, which cannot be met if the regularity of trade is interfered with. A merchant, in order to meet a bill coming due, relies on his ability to discount a new bill against goods to arrive, and when neither goods nor bill are received he must fall back on reserves, which it has not been the practice to maintain. Interruption of the regularity of trade means, accordingly, widespread ruin to merchants and bankers together.

Next, there would be a run for cash and withdrawal of deposits from banks which would also tend to bring about general failure and bankruptcy. Such a run for cash might be occasioned by the stoppage and contraction of the foreign trade itself; but apart from that there might easily be a general alarm among the depositors of banks on the outbreak of a great war as to the safety of their deposits, especially if this country should be involved. No one denies the possibility of raids on the United Kingdom in the event of a great naval conflict, even if there is no possibility, as some contend, of a serious invasion; but what would be the view of depositors were any raids to be actually reported, however small? The funds fell in 1797, when a few Frenchmen, who were soon disposed of, landed on the Welsh coast, and something far more serious might easily be attempted. Naval movements of a formidable kind might also be threatened, so that in the first days of war all our old feeling of security against war's alarms as affecting ourselves might vanish. What the result would be was seen in Germany and

[1] Including the Philippine Islands.

[2] Including Foreign and Colonial as well as British produce and manufactures.

France at the outbreak of the war of 1870, when every bank on the Continent prepared against a run and withdrew its money from London to meet the alarm. Clearly there might again be a run on this country in the more serious contingency described, and foreign depositors might take the view that an invasion of this country and a wide interruption of our communications are more on the cards than we comfortably take for granted. In 1870, after the first run upon London for cash, money came back from Continental bankers to London, and the subsequent steadiness of the London money market all through the war mitigated the disturbance of credit on the Continent. But would money come back to London if we should be involved in a doubtful war with possibilities of defeat and invasion?

On the nature and effects of a great banking panic there is no need to enlarge. Apart from the miseries resulting to depositors and shareholders, who are suddenly impoverished, there is no more potent cause of widespread bankruptcy and unemployment.

The general apprehensions and troubles that would arise from extensive want of employment constitute another kind of mischief, whether the want of employment is due to direct stoppage of trade or to a banking panic or to both causes combined. It is difficult to realise the magnitude of the evil it may be necessary to deal with, and especially the extent of the civil tumults that may occur. We have had little experience of civil tumult for generations, but as late as the thirties and forties of last century there were lamentable incidents. It is within my own recollection that in 1849 bread riots were suppressed in Glasgow by the Yeomanry, not without loss of life. All these tumults would further help to strain credit to the utmost and intensify the banking panic itself.

In this way, then we arrive at the question of the sufficiency of the cash reserve of our credit system in the contingency of the outbreak of a really great war—a war with "unlimited liability." This is not, of course, the only circumstance of our economic condition which the public and the Government should consider beforehand, but it is obviously of special importance, as disturbance of credit would produce or aggravate other mischiefs. Are our present cash reserve arrangements, then, having in view the contingency of a great war, adequate or not?

Investigating this problem we are met at the outset by the suggestion that no preparation can be adequate—that whatever we do the confusion at the outbreak of a great war will be indescribable, and the Government could hardly do anything but order a general suspension of specie payments, as was done in 1797, until the country adjusted itself to the new conditions. It is, indeed, much to be feared that something of this sort may happen. But less inadequate preparations than are at present made may nevertheless be useful. The possibility of avoiding a resort to inconvertible paper is surely worth aiming at. It

was the opinion of good city authorities at the time of the American Civil War that the resort by the Federal Government to vast issues of inconvertible paper might have been avoided, not only with great economy in the conduct of the war itself, but with advantages of political prestige and credit which would have been most material.

Broadly speaking, then, the main facts as to our cash reserves are these:—

1. The liabilities of our banking system may be put at 910 million pounds at least, this being the total of the deposits in the banks of the United Kingdom, including the Bank of England. (See "Economist Supplement," 22nd February, 1908, p. 51.) I believe the real figure ought to be larger so as to include those of Continental and Colonial banks which keep their reserves in London, and to some extent United States banks which also use London as a reserve centre; there is also a potential liability beyond the figure of actual deposits at any moment owing to the privilege of a banker's customers—a reserve banker's customers especially—to borrow in times of emergency. Making all allowance for duplicate liabilities arising from one banker's liability being to another banker, we cannot reduce substantially the round figure of 900 million pounds.

2. Against this vast liability of close upon a thousand millions or more, there is almost literally no provision except the banking reserve of the Bank of England, about 20 to 25 million pounds in recent times. This was explained many years ago by Mr. Bagehot, in his well-known book, "Lombard Street," which happens to be still up-to-date, as there has been no great improvement since, and in recent days our Chairman, among others, has dealt with the topic. Practically it may be admitted that the whole stock of bullion in the Bank of England, the amount held against the note issues as well as the banking reserve proper, may be available as a reserve, which would raise the figure from about 20 millions or 25 millions to about 40 million pounds; but there is hardly anything else except, may be, the 12 or 15 million pounds held in Scotland and Ireland against the note issues of the Scotch and Irish banks.

It will be said perhaps that the coin in other banks should be included, as it will be available *pro tanto* against a run; but the sums, whatever they are, are obviously rather till money, required in the daily outgo and incoming of the business, and could not really be parted with in an emergency. As a matter of fact, they are not usually shown separately in bank accounts, being mixed up with cash at call or in the Bank of England.

It appears at first sight so extraordinary that the banks of the United Kingdom should generally keep no cash reserve in their own hands, that in speaking to a non-banking audience I may be excused for referring, however briefly, to the accounts of different banks to show how their reserves, which are no doubt mostly more than adequate, looking at them individually, consist mainly of cash at call; that is, on deposit with other banks,

or cash at the Bank of England or securities. I shall mention no names, as that might be invidious, and is quite unnecessary for the present purpose.

Let me take first a Scotch bank (A) which happens to come before me as I write. The liabilities of the bank to the public are stated to be £14,541,000, and the assets of cash and easily available securities are described as follows:—

Gold and silver coin, notes of other banks, cash balances with London bankers, and money at call or short notice in London	2,779,000
2½ per cent. Consols, etc.	1,852,000
Stock in Bank of England, Corporation, Railway Debenture, and other stocks	2,524,000
	£7,155,000

This is no doubt a very good showing, as far as individual banking goes, as liabilities of 14 million pounds to the public are half covered by cash in hand or at call and easily available securities; but clearly such assets, even the cash so-called, which consists partly of notes of other banks, balances with London bankers, and money at call or short notice in London depend largely on the London bankers, and through them on the Bank of England. There is no contribution here to the general emergency reserve of the country—a reserve for occasions when every bank is pressed.

Let us take next one of the great London banks (B). Here the liabilities to the public, including four million pounds of bills accepted or endorsed, amount to no less a sum than £69,280,000, and the cash assets are described as follows:—

Cash in hand and with Bank of England	11,870,000
Cash at call and short notice	3,931,000
Bills of exchange	6,644,000
Consols, etc.	5,927,000
Indian and Colonial Government securities, etc.	4,867,000
	£33,239,000

—again a sum in cash or the assumed equivalent amounting to nearly half the liabilities to the public. But the cash proper—that is, cash in hand and with the Bank of England, the absolutely unemployed cash as far as the bank is concerned—is only about one-third of the total. All the rest is dependent on other institutions and the normal working of the market in Lombard Street. In one respect the account is an improvement on A, the cash in hand and at the Bank of England being distinguished from money with other banks or money at call or

short notice; but how much is really in the bank's own hands, and especially how much that is not till money, we are not told.

Let us carry the matter a step further. Mention is made in these accounts, A and B, which are fair specimens of the country and London banks, of money with London bankers and money at call or short notice. What I propose now to look at are balance-sheets of London banks belonging to the special class of discount houses which are used by other banks as places for depositing money at call or short notice. One of these, which I shall call C, shows a liability of £24,673,000 to the public, and describes its "cash" as follows:—

Cash at bankers	1,062,000
Consols, etc.	2,494,000
Loans at call and short notice ...	1,305,000
	£4,861,000

—again a good showing with the money market generally in a normal condition, but with no independent "cash" for an emergency. Another I shall call D shows liabilities of £16,804,000, and its "cash" as follows:—

Cash	259,000
Securities	2,125,000
Loans at call, short and fixed dates ...	998,000
	£3,382,000

—on which the same remarks may be made as on C. The point is, that these bankers' banks, with which to some extent country and London bankers keep their money on deposit, do not themselves keep idle cash in reserve to any extent, but are dependent on the normal working of the market and on the Bank of England.

Thus the conclusion is supported that the only emergency reserve in our credit system is that of the Bank of England. The display of cash at call or short notice, mixed up with cash in hand and at the Bank of England, is found to be generally a display of no cash at all for purposes such as we are considering. There is practically no reserve but the 40 or 50 millions at the outside which can be made up at the Bank of England, with such additions as might be possible in an emergency by the diversion of the amounts held against their note issues by the Scotch and Irish banks.

We have only to look at what has happened elsewhere to see how inadequate the amounts stated are. In the recent panic in America the banks started with about 200 million pounds cash (specie and legal tenders) against 2,500 million pounds of liabilities, or about 8 per cent., and how speedily they were bowled over we all know. A run began which no bank could face. Even in this country, I suppose, the Black Friday of Overends in 1866 is not quite forgotten, when the reserve of the

Bank of England, as large in proportion then as now, was all but emptied in a day. More recently, in 1878, the circulation of the Bank of England, owing to the drain of money to the country caused by discredit, increased about 15 million pounds in two months; and still more recently, at the time of the Baring crisis in 1890, special measures were needed to prevent the outbreak of panic. *A fortiori,* then, should a great war break out and business be widely interrupted, the demands upon English banks, quite apart from panic at first, might easily become overwhelming, and the paltry 25 million or 40 million pounds, or say 50 million pounds, which is all we have to show, would dwindle to nothing in a day or two. Hitherto at times our system has been exposed to great dangers by exclusively *foreign* military events—the Civil War in the United States, the Austro-Prussian War in 1866, and the Franco-German War in 1870-71, all of which did no small mischief to our credit system; but an occasion threatening ourselves would have tenfold danger.

It will be urged, perhaps, that it is not fair to compare our banking liabilities with those in other credit systems, which may be more subject to panic. In America, it may be said, and in this country at former periods, a larger proportion of deposits with banks was composed of savings by the general public than is now the case, when the deposits are more largely the balances of current accounts required daily in business transactions or belong to institutions and companies associated with the banks themselves, and otherwise not subject to panic like the uneducated miscellaneous depositor. There is no doubt some truth in this. But possibly a minute analysis of the deposits might also show that other changes which have occurred are not so favourable, that we are more liable to be affected now by large demands of a legitimate kind than was formerly the case, and that there are miscellaneous deposits of a quite sufficient amount to become the subject of an alarming run if our margin is too small.

It is sometimes said, also, that a narrow comparison of banking cash assets and liabilities, such as has just been made, does not take sufficiently into account the firmness and elasticity of our banking system, the solidity of the credit that has come to be established, and the prudence of our banks in their individual capacity, along with the fewness of their numbers, compared with what was the case at any former period or in the United States at the present day. This would hardly be the place to discuss such questions in detail, and it is the less necessary for me to do so, as our Chairman has distinguished himself by their discussion in banking circles themselves. But granting all that may be said on this head, we must recognise that a credit system which is constructed against ordinary dangers and which may serve fairly well in quiet times or in meeting the ordinary oscillations of business, which is equal to a breaking strain, to employ an engineering phrase, with which a bank reserve of 50 million pounds is sufficient to cope,

may be destroyed by a strain which would require 100 million pounds or more. Once the breaking point is reached the edifice goes. The figures I have already cited amply show that this general prudence is quite consistent with the neglect of individual banks to provide such a reserve against emergencies as would be available in a breakdown of the system itself owing to what we may call an external blizzard.

The conclusion, then, is that the banking position in this country is one of real danger in the event of a great war—a war, to emphasise the point made at the beginning, with unlimited liability. The question is, of course, primarily for the banking community itself, and for the chief customers associated with them, who would act wisely in taking an active interest in the subject; yet if the Government can do anything by way of co-operation or otherwise, surely there is occasion for its intervention. Great economic disorders at the outbreak of a war or when war is threatened may hamper the political and diplomatic action of the Government and impede the direction of our naval and military forces. Instead of attending to the business of the war itself, the Government may have its hands tied by questions of unemployment and civil tumults, and may have to face all at once and with no preparation the dilemma of issuing inconvertible paper. To have a banking system so strong as to go on unshaken in the face of a great international upheaval would be worth a considerable price.

What, then, can the Government do? and what ought it to do in time of peace, when the matter can be quietly taken in hand?

One suggestion that occurs to me must, I believe, be put aside. This is, that the Government should itself accumulate a considerable sum in cash for a rainy day, which can be used to assist in preserving credit at the outbreak of a great war. The difficulty would be that any such sum under the immediate control of the Government of the day, before it could be of service, would have to be placed in the hands of bankers and lent out, and there might be political and even military objections to such a course—objections based upon considerations of the same nature as those which induced the Government in 1797 to restrict the Bank of England from paying in specie. When hostile Governments are competing for the possession of bullion no one of them can be expected to have the fortitude to part with its own special stock, if it has one, although this might be the wisest course. If the Government is to keep a war reserve in time of peace at all it can only be on the principles and for the purposes with which the German war chest is maintained.

What the Government, it seems to me, can do is perhaps to take such measures with its own banking arrangements as will enable the Bank of England in time of peace and quiet to add to its normal reserve. The Government even now, I am inclined to believe, considering the amount of its transactions,

and the various privileges it confers on the Bank of England, keeps with that institution what any ordinary bank would deem an adequate cash balance. According to a recent weekly account before me, the public deposits with the Bank of England —substantially the cash balances of the Government in all its departments—amount to no less a sum than over 15 million pounds, and the figure is frequently larger. This is a considerable sum for a customer whose average weekly income and outgo is three millions, and which is tolerably regular in its operations, although like other customers it accumulates money at one season and disperses it at another. But in spite of this favourable showing for the Government, tried by ordinary tests, what has to be considered is the public advantage, and in this view what I suggest is that the Government should not look on itself as a customer in the ordinary way, but should take advantage of its special relation with the Bank of England to encourage and strengthen that institution in the task of maintaining a banking reserve. As to what additions the Bank of England ought to make, what assistance it should invite the Government to give, and what steps both together should urge upon the customers of the Bank, it would be premature to speak in detail. In an unofficial position I am not prepared to go into the question fully. It would clearly be reasonable, however, that the Government, in negotiating with the Bank of England as to what payment is to be made for the annual service of the debt and for other services rendered by the Bank, and what payment, on the other hand, is to be made by the Bank to the Government for the privilege of note issue against securities, ought to arrange in some way that the expense of the maintenance of a reserve for the public benefit, to be employed in times of emergency, is to be regarded *pro tanto* as a service rendered to the State. In other words, the question of the banking reserve ought to be regarded as of the essence of the whole contract between the Government and the Bank.

My own impression is that the result of any study of the question from this point of view will be that the Government will either increase its payment to the Bank for services rendered or will forego part of the sum it now receives for the privilege of note issue; but in return the Bank will undertake to keep a larger reserve—say 10 million pounds more than are now kept on the average—for emergencies. A hard and fast written contract on this head is not in question, seeing that the reserve has occasionally to be used. But both the Government and the Bank of England can be trusted in such a matter, the principle being once accepted, to establish and maintain an honourable understanding after the fashion with which the guarantee of the various banks to the Bank of England, which was said not to be legally binding, was given and adhered to at the time of the Baring crisis.

Once the Bank of England had come to such an understanding with the Government, it would be in a position, on

the other side, to negotiate with the joint stock and private banks on the same subject. The latter are in a difficulty at present, as there is no agreement or understanding, I believe, with the Bank of England as to the amount of their cash balance the Bank in ordinary times is to maintain in cash; but the arrangement with the Government might furnish a model to be followed, not slavishly, of course, but with suitable modifications.

But apart from particular suggestions the point of the Government interest ought not to be lost sight of. It is supremely interested, and it should not let itself be surprised by events. There will be plenty to think of at the outbreak of a war, even if the banking position should be strong and not weak.

Apart from any action which the Government, the Bank of England, and other banks may take, it is to be hoped that the general discussion of the subject will not be without its uses. The root of the evil appears on analysis to be largely individual, and an abuse of the theory on which deposit banking is founded. It is advantageous for the individual to deposit one's funds in a bank, primarily for security and secondarily for the interest and other advantages banks have found it expedient to give, so that customers instead of paying a bank to keep money for them, which was the way banking began, receive payment for making their deposits. But what has happened is that Englishmen have overdone their trust in banking. They rely on their bank to pull them through an emergency and keep their normal balance with the banker at too low a level, thereby incurring great danger when an emergency does occur, and weakening the power of the banker in his turn to maintain a cash reserve. Next, the value of the interest obtainable on deposits is exaggerated, and the banker, having to pay interest to attract and keep the deposits, is further crippled in the necessary function of keeping a reserve of idle cash. Quite apart from bankers, therefore, business people have to learn the expediency of not using their floating money up to the hilt, but of keeping something in reserve. I have heard it said by more than one successful business man that one reason of their success was their ample provision of cash for an emergency, so that they could not be taken aback. The rule, of course, should be moderation in all things; but the problems of our banking system would certainly be easier if it were the habit of everybody as well as bankers to keep a larger proportion of their means in liquid form than they do. We shall be lucky if the lesson is learnt without the great war which will surely bring it home.

Mr. SPENSER WILKINSON:—It appears to me that in his paper to-day, Sir Robert Giffen has shown the very greatest judgment, not so much in his statement of the case and of the necessity for particular measures, but in the very great moderation of the proposals he makes with regard to so difficult a matter. I do not feel competent, as a person without any

financial experience, to discuss proposals for a solution; it would be very difficult to go beyond the general suggestions made by Sir Robert Giffen, namely, that the Bank of England in particular and the other banks and private individuals should further develop the practice of keeping a reserve. I for one do not see how it would be possible to go much beyond that, although I should agree, as far as I understand it, with Sir Robert Giffen's proposal, that the Government should use its influence, as far as possible, to assist the bank in that direction. But I should like to be allowed to make one or two remarks on certain points. First of all, Sir Robert Giffen uses a phrase which has been occasionally used of late years, "Wars of limited liability." I think there is a danger of its being misleading. It is based on a distinction which was drawn by Clausewitz in his "Theory of War"; but Clausewitz did not mean by that to suggest that wars should be roughly divided into two classes, wars which were dangerous, and wars which were not—those in which you risk everything, and those in which you do not. It was a historical description. He based his theory on the experience of his own lifetime, the experience of the wars of the Revolution, and as he tried to expand his theory by the study of previous wars, he was struck by the great difference in character between those wars of the 17th and 18th century, of which he examined the history, and the wars of his own experience; and he pointed out that a great change had come over the character of war in consequence of what may be called its nationalisation; in consequence of that which took place, first in France during the Revolution, and afterwards in the other countries opposed to France, namely, that the war became a national affair, carried on with the whole resources of the nation. He laid it down that a war of that sort was a struggle for existence, and that the wars that had been previously waged—dynastic wars, carried on with small standing armies—could not bring about anything like the same kind of risks. Clausewitz raised the question whether all future wars would have the character of struggles for existence, such as had belonged to the wars against the French Empire; but subsequent students of history have almost unanimously agreed that the earlier kind of war is very unlikely to recur, and since Clausewitz's time wars between great States have always borne the character of unlimited liability. The matter just now seems of importance. The distinction has been erroneously used by some recent writers, who, it appears to me, have not understood the theory of Clausewitz. I see on my right and left Colonel Maude and Major Stewart Murray. If any men in England know Clausewitz's theory it will be these two gentlemen, and I hope they will support me and find themselves in agreement with me on that point. The subject which Sir Robert Giffen has brought before us comes under the general head of surprise in war. The greatest source of weakness in war is when one side or the other is taken by surprise. A surprise consists in this: that you have to meet a state of circumstances that you did not foresee, and, therefore, I hold that the greatest service is done to us by Sir Robert Giffen in calling our attention to this particular point about the gold reserve. But there are three respects in which surprise is likely to occur in this country. The first is that of the gold reserve; the second is that of the food reserve; and the third is that of unemployment. I think the danger of unemployment is not so great as is imagined, because in a serious war it will be absolutely necessary to call out all the reserves and to strengthen the forces in every possible way, and thus a very large number of men will necessarily pass into the army in one shape or another, and their disappearance from the labour market will relieve the strain of unemployment.

When you get half a million or even a million men in Government service and Government pay as soldiers in one form or another, you will certainly relieve the pressure in that direction. The second danger of surprise is that immediately on the outbreak of a serious war, certainly within a week, people will awaken to the fact that this country has a limited food supply, and you will have a run on the food supply in the same way that you will have a run on the gold reserves. Sir Robert Giffen referred to the Prussian Fund, which is kept in gold in Berlin. I think that fund was for quite a different purpose than the purpose Sir Robert Giffen has in view. His object is to do something to prevent the credit system collapsing on the outbreak of war, and I am inclined to think, and have long been inclined to think, that nothing you can do will prevent that, because the credit system is so great, and the liability so great, and the reserve you have so small, and the possibility of increasing it so slight, that I doubt whether anything you can do will prevent a suspension of payment or some collapse of that sort shortly after the beginning of a war. But I understand that the Prussian Fund is not at all for the purpose of propping up credit, but simply and solely to be used for the mobilisation of the very large forces which Prussia would put into the field. I should like to suggest a different sort of precaution to a merely financial one. After all, this appears to me very largely a matter of the Navy. I remember, a good many years ago, when I had occasion to write about the Navy, and think a good deal about the case of a British war, it seemed to me that a British war could be classed in three ways. Either you are going to have a war in which from the beginning you will command the sea, or you will have a war in which you start with having to fight for the command of the sea and eventually secure it, or you will have a war in which you will lose the command of the sea. In the third case, if you lose the command of the sea you lose everything. In the first case, if you start out with it and keep it, I believe you will be moderately secure, and that then, and then only, you might keep up internal credit. But in a war in which at the beginning you have not got command of the sea, it appears to me that you are bound to begin with a very great panic, with an Overend and Gurney panic, and a Lancashire cotton famine rolled into one; and the soundest precaution against that is to take care that the Navy is in order; by which I mean not so much kept at a given numerical standard, although I hold a high numerical standard to be requisite, but that its administration, its organisation, its discipline, and its training shall be as good as they can be.

Major S. L. Murray (late Gordon Highlanders):—I associate myself with the remarks made by Mr. Spenser Wilkinson, especially with those in which he referred to the great master-work of Clausewitz, "On War," of which he has, I know, made a lifelong study. It is with regret that I find myself called upon to speak, for with such a subject and such a lecturer this room should have been full of speakers far better acquainted with banking matters than I am. Their absence is much to be regretted, especially as one knows that the necessity of a larger gold reserve has been much discussed of recent years in banking circles. It is impossible to over-estimate the importance of this subject, which has been so ably brought before us to-day. And the weight which attaches itself to any utterance of Sir Robert Giffen, makes the warning he has given us more significant, or perhaps I should say, more ominous. I have myself long taken such an interest in this subject as one unacquainted with the details of banking can do, for it is obvious that if our monetary system, our

credit system, be not based on a foundation sufficiently strong and solid to stand the emergency of a great European war, then our edifice of Imperial Defence is built upon sand. That is plain. It is noteworthy that last week the German Chancellor was asked in the German Parliament if he would not release into circulation the millions locked up in the German war chest? His answer was, that most certainly he would not, because war might come at a time of financial crisis, which shows that foreign Statesmen do not neglect this question of International credit which has been brought before us to-day, but are well aware of its gravity. It also follows that they will be well aware of the possibility of so manipulating that system of International credit as to embarrass or weaken a hostile Power just before or at the declaration of war. That, I think, we may take for granted. In the few minutes which are available I will only endeavour to deal with one or two points in this very able lecture, which I should like to emphasise. The lecturer refers to the necessity of the maintenance of our credit system during a European war, because, as he says, "there is no more potent cause of widespread bankruptcy and unemployment than a banking panic." Also he says: "It is difficult to realise the magnitude of the evil it may be necessary to deal with, and especially the extent of the civil tumults that may occur." Here we touch the great question of the preservation in a modern industrial democratic state of internal peace during external war. This is a matter to which I have given much study, for I believe that it is of much greater importance, and contains much greater dangers, than most people imagine. Since our last great war—the Napoleonic—the whole life, the whole nature, of the European nations has changed. And the whole system of warfare has changed to a degree quite unrealised by the majority of our countrymen, who cannot be made to understand that to-day every modern nation makes war as a nation-in-arms with the whole concentrated force of its manhood, physical and intellectual. The vast forces thus called into play render costly preparation on an equally vast scale absolutely necessary, and thus renders the money question more than ever paramount. And the means of exhausting, or weakening, the money power or credit of an adversary, manifestly has consequently become a warlike operation of the first importance, such as causing a drain of gold from the hostile nation by a financial crisis arranged just before or at the outbreak of war, for which contingency the German war chest is kept. It is a contingency we should also keep in mind and prepare for. The great difficulty which each of the great modern industrial nations will have to face in a great war is that of providing *work and bread* for their industrial millions of toilers during the war. Work and bread each State *must* provide, or face the alternative, an outbreak of the volcanic forces which everywhere underlie democracy. France, after the Franco-German War; Russia, after the Russo-Japanese War, are cases in point; many more might be added, but there is not time available. An as instance of a modern crowd, consider the crowd at the declaration of the Poll at Peckham on 24th March, estimated at nearly one million strong. Consider if, during war, that crowd were without work or bread; imagine if that crowd were concentrated round Westminster! I will not pursue the subject. It may be laid down that a proper organisation of a modern industrial nation for war should consist of two distinct systems of organisation :—(*a*) ***External***, or naval and military operations, aiming at the overthrow and disarmament of the enemy; (*b*) ***Internal*** organisation for war, to insure the certainty of work and bread for the millions of toilers, of voters. Under internal organisation come three great divisions, equally important parts of the

same whole, which should be considered and worked together to the desired end of eternal peace. They are:—(1) Our monetary system, our credit system, as the necessary factor in all our trade, business, employment, wages; (2) Our commerce protection, the materials and products of industry, the channel of wages; (3) Our food supply, that the war-price thereof shall not place food beyond the reach of the 7,000,000 or so of our poorest. All these three are the component parts of the great problem which we have to solve (for we have not done it yet) of how to insure work and bread for our industrial millions in a European war. Each of these three has got to be put upon a footing that will stand the emergency of a great war. The solution of each will be a great step forward. That is one reason why I welcome this lecture, and hope that it will bear good fruit. For what I have called the external organisation, the naval and military part, the soldiers and sailors have done, and are doing, their best, though terribly hampered by Parliamentary politicians, who do not understand, who know nothing about modern war. As regards the internal organisation for war, the gold or credit supply, the commerce protection, the food supply, the soldiers and sailors can do nothing, for the country does not listen to them. Civilians only can do it, and should do it, and *must* do it, unless they wish to see our race go under in the next great struggle when it comes. I hope, therefore, that this matter of our monetary system, our credit system, will not be allowed to drop, but that some association will be formed in the City to press it forward. It should not be allowed to drop. I hope that it never will be allowed to drop. There is one more point I would like to make. It is this:—The amount of money which the country will have to find for a great war will be stupendous; far greater than most people imagine. Consider for a moment the case of one possible hostile alliance, Germany and Russia, say, twenty years hence. Germany with her new navy ready at last will threaten us in the North Sea; Russia, reformed, re-organised, more formidable than ever, will move 500,000 men on to Afghanistan. Such a war cannot be put at less than £250,000,000 or £300,000,000 a year for two at least, or perhaps three, years, *i.e.*, a possible £750,000,000 or £900,000,000 before it is finished. So it seems, taking all things into rough account. And if, through neglect of adequate preparation beforehand, through false economy beforehand, we fail, then in addition to our own enormous war expenses we shall have to pay as war indemnity those of the enemy. Such a war indemnity would absolutely ruin our trade for a generation or more. It is worth some sacrifice—the money and organisation, external and internal, of adequate preparations—to avoid. It can only be avoided if the civilians take their share of the preparations. As their special present share I would urge the industrial or internal organisation of the United Kingdom for war, towards which this lecture tends as a most valuable contribution.

Colonel F. N. Maude, C.B., late Commanding Hampshire R.E. Vols. (late R.E.):—By the merest accident I find myself this afternoon shoulder to shoulder with my friends, Mr. Spenser Wilkinson and Major Stewart Murray, who have anticipated many remarks I was going to make, more particularly everything about Clausewitz. The distinction Mr. Spenser Wilkinson has drawn between the war of limited liability and the war of unlimited liability is historically correct. Clausewitz had not in his mind at the time any question of the use of the word "liability" in its modern sense. Clausewitz was a prophet when it came to a question of war, and he foresaw, far in advance of his time, what that unlimited use of force which he always advocated must bring about. His principle

was that "in war the use of force is absolute," and any attempt to hinder its development was quite out of the question and false philanthropy. Following from that, he did not define his "force" as merely "force relating to the use of weapons in the field," but he meant any kind of force which would induce the enemy to bow to your will. It is not necessary to form troops up in line of battle and shoot at each other. If you can compel the Power you are at war with to do what you want without recourse to absolute physical contact, there is no reason why you should not do so, particularly if that happens to be the cheapest and simplest way. Following that idea out, this is the attitude of mind with which the Great General Staffs of several countries on the Continent view it. They do not consider it necessary to go to actual fighting if they can, by the creation of a gold panic or other equally effective means, so thoroughly paralyse the enemy's vitality that the organisation for defence will no longer work. In that way they have gained all they wish to gain without the trouble and expense of getting their own men killed. Mr. Wilkinson went on to say that surprise was the greatest danger against which we had to guard. This surprise in our case cannot be guarded against entirely by any Navy; that is an impossibility. It depends entirely upon the attitude of mind of the governing "heads," not the governing "class," towards what is fair in war and what is not. Is there such a limitation as a limitation of treachery to be considered in war? You cannot conceivably guard against treachery, and what we call treachery on the part of the enemy in war is invariably perfectly fair and reasonable on our part when we succeed. When Napoleon seized the bridges over the Danube at Vienna by one of the very meanest tricks ever played, the enemy, who were beaten, complained very bitterly of the infraction of the rules of war, but the French thought it was defensible, and they have written books to prove it. We can never quite see in advance what view our enemy may take of this vital problem. It really comes to what is fair in business competition. When two business firms, not of the very highest standing, say, are fighting for very existence, where do they draw a line as to what is fair and what is not? Supposing you were to remove the power of the law backed by the police in the case of such competition, where would the business firms stop? It is a difficult ethical problem to solve, but I think there are many cases one reads of in newspapers where the code of honour has not been quite the same as one would expect from a British Government trusting to the honour of its neighbouring nations. That is where one of the chief dangers of surprise comes in, and the easiest way of securing a surprise which for the time being would paralyse us would be undoubtedly to create a gold panic on the London market twenty-four hours before the declaration of hostilities. It is quite impossible for me to say how much gold is held by us in reserve for foreign countries — Sir Felix Schuster knows all these details far better than I do — but it amounts, I think, to about 25 per cent. of the total gold reserve of the country, and the sudden presentation of a demand for gold to that amount would, I imagine, throw this country into a state compared to which Overend and Gurney's failure was perfect child's-play. Follow that up for a moment. From that would result an absolute breakdown of credit for the time being. That means that a single sovereign in gold would not support the superstructure of credit which it at present supports. I do not know what the ratio now is exactly, what the amount of credit trade done in a day is to the amount of gold which changes hands; but I believe it is about 1 per cent. Assume that the consequence

of such a shock to credit would be that the sovereign only did one-fifth the work it did before, the shrinkage would break down every business in London to the ground. Then, because there was this shrinkage of credit, the outcry for gold would be greater than ever, and all the hoarding instincts which exist in all classes more or less, but more particularly in the less intelligent class of people, would revive, and the money would disappear into stockings, up chimneys, and into the usual places where troops used to look for it in the days when looting was common. We can never solve the question absolutely, but we can at least palliate it in the following manner: Can we supply or devise a magnet which would be sufficiently powerful to draw this gold out of its hiding place? There would be always approximately the same amount of gold in England, because merely as a matter of military expediency we should not allow the actual gold coins to leave the country. It might be paid out of the till in the bank when the bills were presented, but I fancy it would never embark on board a ship, because it would be taken charge of by *force majeure* on its way to the docks by the Government. We could not afford to allow that gold to go, owing to military expediency, and expediency is the only law in this case. Therefore, the same amount of gold would be always in the country, and the problem is to make that gold do as much work as possible in a given time. It seems to me on that line we can at least arrive at the solution. All ordinary securities—the securities which the banks hold in addition to their bullion—could not be realised in time of war, for the simple reason that nobody would have any money to pay for them. Nobody will buy what they do not need, and there is only one thing they absolutely need in time of war, and that is food. I think Major Stewart Murray has said that nothing ever came out of discussions started in this Institution except blue-books. A few years ago Major Stewart Murray himself read a paper opening a discussion in this Institution which led to a Royal Commission on the food question, I happen to know, entirely through his exertions. That blue-book on the food supply in war time has had very far-reaching consequences indeed, because it at least shows how we can maintain in this country a security which will be readily realisable in war-time and realisable for gold. When that Food Commission reported, amongst one of its recommendations was a recommendation that we should store food in Manchester in bulk. If you only insist on having gold for your food you will always draw the gold out of people's pockets. As far as that Committee went, the only kind of food they contemplated was heavy grains, which are very bulky and very difficult to store; but since that time we have gone so far scientifically that it is possible now to preserve food, condensed, with all its nutritive qualities, and keep it ten years or upwards without any loss of those qualities. You can store about a million of rations in a cube of ten feet. If you put down great masses of food of all sorts and kinds—grain and otherwise—the men who hold that would be perfectly certain to draw gold out of people's pockets or wherever it was, and my contention, that something might be done in that way, is based on the fact that in the old days it happens to be exactly what Frederick the Great really did in all the sieges, or what he directed his commanders to do in all the sieges in which his troops were concerned. He said: "As soon as the enemy appears in the vicinity, send round and collect the principal merchants at your office and invite them to lend you all the money they have got in their possession, pointing out that there will be a very large outlay on the labourers and the troops in wages for the work done on the fortifications, and in a very short time all that money would be back

in the merchants' pockets, because the people must buy their food and pass the money over the counter in order to get the food out. When you have exhausted that supply of money and the siege is going on, you again send for the merchants and borrow the money over again, and so you go on; the money is circulated round and round, the same coins over and over again." He finished his letter by saying: "And when I come and relieve you I will see the bills are paid." Frederick the Great's word was so good at that time that he always succeeded in getting the money, and I think the English Government's word is quite as good, and the situation is analagous. If we take up the problem in the same way we shall be equally able to borrow all the money we want and keep it circulating round and round, doing its work over and over again, instead of seeing it hoarded in the stockings my friend has spoken of.

T. Miller Maguire, M.A., LL.D. (Barrister-at-Law, Inner Temple):—I am very loth indeed to interfere in a discussion presided over by a gentleman of the highest eminence in finance and inaugurated by a gentleman of such great authority, one whose books I have read since I was a schoolboy; but I think you will admit that the discussion has somewhat run away from the gold reserve, and that being so, I think I am justified in following the remarks of some of the speakers. I quite admit the great value of a gold reserve, whether it be the reserve of an individual or a nation, and I also admit the great value of credit. But you can get credit without gold, and be just as happy and prosperous without either, at least so history teaches me. Mr. Spenser Wilkinson refers to Clausewitz's works. I have read them again and again, but I am certain I shall never read them again, if I can help it. His authority is not to be taken as infallible in any sense of the word. My friend Mr. Spenser Wilkinson almost proved this statement by his distinction between "limited" and "unlimited" wars and dynastic and national wars. Clausewitz is discredited even in Germany. I advise Colonel Maude to read Von Cæmmerer and Moltke; but I will not trouble you with much discussion as to which authority is the better. We can learn just as much about credit and reserves of gold from our own history as from German history. One thing is perfectly clear, that since the year 1793 many a State has entered upon a war, conducted a war, and won battles and employed many myriads of men in war, with very little credit and practically no gold. Colonel Maude does not agree with that statement, and therefore I must prove it. What credit had the French Republic in 1794? What was the value of its gold reserve in 1794? What was the value of all the gold in the French Exchequer in 1795? Sir Robert Giffen knows those things better than I do. He knows all about the depreciation of "Mandates" and "Assignats." The French Republicans, like the Huns and Goths, being a new Power of a new species, went forth to conquer, and carried the banner of their Republic and afterwards of their Empire, from the Rhine to Moscow, and through the Southern peninsulas and to the Baltic, based on lack of credit and living on their neighbours! Is not that so? Did not Napoleon "make war support war," just like Mongols and Turks? Is it not so? History, then, is read by different people manifestly in a different way. It is like political economy, which we are now told nobody can understand, or like texts in theology, which not only nobody can understand, but about the interpretations whereof people kill one another. But let us come to another nation. We will take England. What about England in the years 1795 to 1819? How much gold was paid in exchange for a £5 note then? I thought it was then penal in England to pay in gold; I thought a banker if he

changed a note for £5 would be punished. I speak under your correction, Sir Felix; am I right?

Sir FELIX SCHUSTER:—"Quite right."

T. MILLER MAGUIRE:—A banker was punished for changing a £5 note on Trafalgar Day, 1805, and yet we cannot do without gold! We fought from 1797 to 1815, when it was penal to pay money in gold. We spent during that time some 700 millions sterling in war; we conquered Napoleon; we maintained fleets on every sea. When we paid no gold in England we procured specie to pay the Spanish muleteers (1812), and, if I am not mistaken, in 1813 we absolutely paid 13 millions sterling in gold to Germans and other nations to waken them up and to pay their soldiers to fight against Napoleon; and yet we cannot live without gold! Of course we can live without gold. I come to a greater example still. I suppose some of the non-commercial gentlemen here have heard of Greenbacks. You, Sir, know perfectly well what they were, and perhaps some of your colleagues in finance know better than you do, because I daresay there are plenty of Greenbacks still knocking about unchanged in their coffers. I know the lecturer has heard of them and seen them plenty of times. The United States Government in 1862 and 1863 was being beaten in every battle, and after the battles of Fredericksburg and Chancellorville its credit was reduced to such a low ebb that the poor Irish peasant girls who were sent money from their sweethearts across the Atlantic went to the banks thinking they had twenty dollars and found that they had only got ten really. Is that so, Sir?

The CHAIRMAN:—"Very likely."

T. MILLER MAGUIRE:—I am absolutely right, I think! Very good. I was told the other night by a new-fangled professor of political economy that the old political economy had gone to Saturn, and that Adam Smith and Mill and Say and other teachers of my youth are not worth a guinea all told. If so, the lecturer and students like myself wasted money and time in our boyhood very foolishly. But is all political economy gone to Saturn? Are Goschen and his Exchanges—"Foreign Exchanges"—gone to Saturn? Do you still believe in Goschen's "Exchanges," Sir? You do? Good! But Goschen proves in his "Exchanges" that in America, merchants could scarcely get any gold (1862-3) except at the most terrible rate of exchange premium. What did the United States do? Did they go crying that they had no credit, and that they must burst? Not they! They fought more vigorously to re-establish their credit. They fought and lost about 150,000 men and added £500,000,000 to the national debt in the interval between the time when Greenbacks were discredited (December, 1862) and the end of the war (April, 1865). I think I have said enough to put a very heavy *onus probandi* on people who believe it is the rich nations and the gold reserve nations that win battles. It is the men who win battles, and not the purse. How much money had Frederick the Great, 1757-1760? It is poor nations that win, and not the rich nations that win. Which was the richer and more numerous State with most money reserves in 1870, France or Germany? Which won? The nations that deny themselves, win; it is not the luxurious nations that win. I am supported by an illustrious writer, renowned in connection with all points of wisdom, Lord Bacon. Lord Bacon's authority must be accepted. He is a better philosopher and politician than any two Party Cabinets put together. He was a political sage and seer; not a mere windbag of the hour. He lived in the glorious

days of great Elizabeth, when the English were men, and not merely miserable shibboleth pronouncers and partisan sophists, such as I saw and heard in Peckham on both sides a few evenings ago. Lord Bacon declared in his Essay on "The True Greatness of Kingdoms and Estates": "Neither is money the sinews of war (as it is trivially said) when the sinews of men's arms in base and effeminate people are failing: for Solon said well to Crœsus (when in ostentation he showed him his gold): 'Sir, if any other come that hath better iron, he will be master of all this gold.'" I entirely agree with the statement about the necessity for a gold reserve; but this lecture only proves to me in what a terribly serious condition the whole of modern humanity must be. Reflect carefully on the terrible statements on page 2 of the printed matter supplied. The lecturer dwells on the very serious consequences of the financial dislocation in various recent wars, though in not one of those discussed was our nation, "which is the very citadel of the modern financial system," engaged. He very eloquently emphasises the fact that in addition to the other evils of great wars—"the exhaustion of resources—with loss of life, disease and misery which would remain what they have already been—there would be new and formidable evils resulting from the breakdown of the international system of credit." Verily our financial whistle is a very costly instrument in time of peace, and always out of tune in time of war. It never could lead any army or race to Glory and Prosperity. I have always held that our modern civilisation is a farce and a fraud, and in all probability likely to be the curse of the future of the European and American races. It develops credit and capitalisation and tramples on the souls and minds and bodies of humanity. It does not develop manhood, otherwise this part of the lecture could never have been written. The lecturer is speaking of the possibility of war with two Powers. We have often gone to war against several Powers, as in 1807, when we were practically at war with all Europe, immediately after the peace at Tilsit. Here is what one of the best authorities in Europe (the learned lecturer) says: "Such a war (*i.e.*, with two Powers), it seems to me, would bring upon us as well as upon the whole community of civilised States, to which the system of International credit extends, QUITE UNPRECEDENTED CALAMITIES AND DANGERS."[1] In other words, not because we are decadent merely, not because we cannot fight, not because we are badly armed, not because we have bad generals, not because of any of the causes of failure recorded in the annals of history, but simply because we are living on a false and unnatural basis of this wretched kind in this debasing modern civilisation—a basis of credit which is taking the spirit of manhood out of humanity. I could go on for an hour on this point, but I must give time for other speakers, after having made a small attempt to set an example of loquacity to them. I conclude by heartily thanking Sir Robert Giffen for his most instructive information and his sound advice to our temporising rulers to pay some heed to the principles of statesmanship; and, as to the gold reserve and finance, as well as to the other questions which have been discussed, "to take some thought for to-morrow."

Lieutenant CARLYON BELLAIRS, M.P. (late Royal Navy):—I have only had a hurried glance at the paper, as I was detained by other duties; but I understand the proposition of the paper is a comparatively simple one: to add ten millions to our banking reserve. In other words, I take it Sir

[1] The capitals are mine.—T.M.M.

Robert Giffen thoroughly holds with Mr. Tierney: that if we have a strong Navy and a full Exchequer we can defy the world. I think that is probably the background of the proposition, and it is one I hold very strongly myself. But I do not at all agree with introducing into the discussion of papers like this all the fads like food supply and various other things which are always being aired in this Institution by certain speakers. Looking back over the period to which the last speaker has referred, I think he left out 1825, which was a time when there was a panic over the bank reserve. The reserves were depleted about 8 millions, and the Government had to interfere. Then we come to the Overend and Gurney panic, which was so great that the bank reserve in one day went down 50 per cent., and the Government had to send circulars to every Embassy in Europe in order to allay anxiety in all the European countries with regard to the British financial position. That shows with what grave anxiety the Government regarded the position. Dr. Miller Maguire also referred to 1797; the effect of the banking crisis in that year, when the reserves were depleted to such an extent that there were only 1½ millions left. It was known there was going to be a further run on the bank on a Monday, and the Privy Council was summoned on the Sunday, and the suspension of specie payment was decreed on the Sunday to meet the situation. The fact of the bank reserves being so depleted and the suspension of specie payment for twenty years undoubtedly made the war highly unpopular, and that shows the importance to some extent of having good bank reserves. Wages suffered through being paid in paper, and I remember reading in Archdeacon Wilberforce's "Recollections" that the war had become highly unpopular in 1797. The position of the country at that time was one of grave anxiety. We were threatened with invasions, we had mutiny in our fleet, we had evacuated the Mediterranean, and although that year we won the battle of St. Vincent in February and the battle of Camperdown in August, it did not allay the public anxiety sufficiently to restore our financial credit. The battle of the Nile came the next year, 1798. I think it all goes to show that it is a wise precaution somewhat to increase the banking reserves in this country which have been built up on a peace basis. The whole thing is organised on a peace basis, for we have had no anxiety in regard to our naval position for practically a hundred years, since Trafalgar. After that battle all anxiety was completely allayed, and insurance rates tumbled down 18 per cent. immediately afterwards, and remained down, and we never had any more anxiety as to our naval position. We have built up this credit system on practically a hundred years of peace. There is no doubt that we are now about to engage in a maritime rivalry, in which we may see great European wars, and in which it may be well to take stock of the situation, as Sir Robert Giffen suggests, and work with a higher bank reserve than we have been in the habit of doing for the last fifty years.

Sir Robert Giffen, in reply, said:—I hope I may be excused for not saying much in reply, because I am not quite sure that I heard all that the speakers have had to say. To some extent I find myself very much in agreement with some of them, as to the importance of the different topics upon which they insist; but it seems to me, especially with such questions as the importance of the food supply in time of war, that some of the topics were a little away from my subject. The importance of all these different things is not to be questioned, but it is perhaps a mistake to run any of those topics one against the other. My feeling is that we have to prepare ourselves in many unexpected directions if there is a

liability to wars of the kind that have been described, and for that reason I do not wish to enter upon anything which would appear like a controversy as to the relative importance of the different questions. I should like to make one remark with reference to Colonel Maude's suggestion, that in the event of a war or the threatening of war we ought to prohibit the export of gold, and that that would be of assistance to us in the time of emergency. This is a very old idea. It was what was done practically in 1797, when the Bank of England was restricted from paying in specie. The result was one which I hope we should all wish to avoid, because we had inconvertible paper in this country, not only for a short time, but for twenty years, with many incidental evils and great difficulty indeed in returning to a proper basis. That is the sort of thing we ought to avoid. The mischief that might arise now from anything like a restriction of specie payments or from any measure like the Government prohibiting the export of gold, would probably be in proportion much greater than it was in 1797, or the twenty years that followed. England has become much more important as a bullion market since then, and of course to prohibit the export of gold would be practically a prohibition of the trade in bullion, which is not a matter by which we should be advantaged. It is to avoid these things if possible and to avoid the danger of inconvertible paper that the Government ought to see to it in time of peace that the reserve of gold is ample for the contingency of war. That was the whole point of the paper. One remark of Mr. Bellairs, I think, perhaps rather exaggerated: what happened in 1866. I happen to know something of the circumstances of the circular which the Foreign Office sent round in 1866, trying to explain away the crisis of that year, and I think perhaps it ought to be mentioned that the precedent was rather a dangerous one which Lord Clarendon set at that time, and the City authorities were by no means agreed as to the expediency or the necessity of that circular. Still, it is quite true, as Mr. Bellairs has pointed out, that the excitement of that time was very great, and the circular showed what commotion there might be in Government circles when anything like a panic takes place. The danger of a bank panic, therefore, when a great war is threatened is one to which no doubt any Government would give its mind—too late, as I think, because now is the time when we ought to prepare.

The CHAIRMAN (Sir Felix Schuster):—I have now much pleasure in moving a vote of thanks to the reader of this paper—a paper which is of considerable importance, and to which we have all listened with great interest, and one which I hope will have its influence, especially with our rulers, because, in spite of what has been said this afternoon, when civilians speak on these matters they are not always listened to by the authorities with that readiness which we think the importance of the subject deserves. I think the question of our gold supply is one which our authorities at the Treasury and at the War Office ought to bear in mind. After all, it is a question of reserves. You have reserves of ammunition, or at least I suppose you have—we understand you have—and reserves of men and guns and horses.—("Not of horses.") Well, we civilians suppose you have, and it is not for me to express an opinion. Anyway, what those of us, who have taken an interest in this subject and have advocated the keeping of larger gold reserves, maintain is, that in case of a sudden outbreak of war with one or two of the great European Powers, you will find that this question would put you in a very serious difficulty indeed. With regard to what Dr. Miller Maguire has observed as to our present

state of civilisation, I may perhaps be in complete agreement with him, that it might be desirable for all of us to have done with it and return to a different state of society altogether; but we have got it now and we must make the best of what we have got. If you were to carry on your wars with Greenbacks and Assignats, I do not think you would get very far. I would remind you that at the time to which he has alluded, when gold payments were suspended—I must refer to the food supply for a moment—I believe that England produced her food supplies at home. We did not buy our supplies for our people, nor for our troops, nor for our men, abroad; we had not to buy from foreign countries all the raw material used for our manufactures—the manufactures on which our people live. If a war were to break out and the credit system were to break down, if we could not pay in gold what we have undertaken to pay in gold, then we should find that our people would be put into very great distress at a very early moment after the outbreak of hostilities. That is one of the reasons why, I think, this subject is of importance. In reply to Mr. Spenser Wilkinson, I should say yes, of course, we must have an efficient Navy. We cannot do without a Navy to keep the command of the sea; but this difficulty of gold reserve will arise before the first shot in the war is fired. As has been pointed out by Colonel Maude, who referred to business morality—I will not say anything about business morality, because I do not think we need go into that question—I do not know where morality comes in when it comes to a question of your enemy. I think it will be his duty to hurt us wherever he can, and it will be our duty to hurt him wherever we can; and for his own protection he will draw all the gold that he possibly can away from our shores, and try to cripple us in our credit, in our home manufactures, in our industry, and in our International commerce. It will be quite right for him to do so, and it will be for us to see that he cannot. With regard to the paper, there has been one subject mentioned as to prohibiting the shipment of gold. I think we should certainly prohibit the shipment of gold to the enemy. I suppose all commercial transactions with the enemy would come to a standstill. But there are obligations to neutrals also, and those obligations will have to be carried out if the credit of the country is to be maintained, if our International commercial and banking position is to be maintained. I am in general agreement with what Sir Robert Giffen has so well said. The International credit system is a very intricate system, and cannot be discussed at a meeting like this. The effect of it has never been tried in great European wars; but no doubt a great strain would be put upon it. I think perhaps he has to some extent overstated the difficulty, and perhaps he has rather exaggerated the weakness of our credit system. I am convinced that our credit system at home in ordinary times, in peace time, works admirably, and I think that the precautions that have to be taken need not go into such very large figures, and need not be so very costly. I say that for this reason: This country has an immense power of drawing gold from foreign countries. We are a creditor nation. I believe our income from foreign investments amounts to something like 120 to 150 millions sterling per annum, which sums we are entitled to draw from foreign countries, and as long as we keep command of the sea we shall draw it from foreign countries, and draw it in gold, or its equivalent. Therefore, the danger is one that would come at the outset; that would come as a surprise; and to guard against such dangers I do not think the amount need be excessive. We need not go into hundreds of millions. I agree with Mr. Spenser Wilkinson, that perhaps the recommendations Sir Robert Giffen has made are rather moderate.

I agree that it is only a beginning, and we want to go further. But still his recommendations go to the root of the matter and carry us some distance. Sir Robert has said that there is no provision for gold payment except the bank reserves in the Bank of England. I do not think that is quite correct. I believe at the Royal Mint a census was taken last July of the gold held in the banks apart from the gold in circulation. The results have not been published yet, and I have no official information; but I believe it will be found that the amount so held is considerably over 30 millions—from 32 to 35 millions is the amount estimated to be held by the banks in the United Kingdom, apart from the ordinary coin in circulation, which is estimated at something like 80 millions. That 30 millions in the bank is really in addition to till money, and is an actual reserve. Then, again, you have the notes in the hands of the banks, and I believe it would be found if a census of those notes were taken that they amount to something very considerable. I am personally persuaded. although I have no figures to go by, that the whole increase in the bank note circulation of the Bank of England since the Bank Charter of 1844, which amounts to about 20 millions, is not in the hands of the public but in the hands of the bankers. These notes are convertible into gold as long as the Bank of England carries out the obligations put upon it by the Act of 1844. I for one maintain—and I am sorry to say so—that if very serious strain were put upon the bank, and a very great emergency were to arise, I am not quite sure that the payment in gold would be as certain as we like to look upon it. I say that for this reason above all, we advocate that the Bank of England reserves should be strengthened. Conditions have changed very much indeed since 1844, which was the last time this question was considered by the Legislature. The whole of the conditions of commerce have altered, the volume of trade has increased enormously, our International position has changed enormously; and therefore this question should be considered, not only academically, but really, by those who have it in their power to bring about a modification, if it is found necessary to do so. One important point that has not been touched upon is the question of the Government Savings Banks. You are well aware that the Treasury itself—the Government—carries on the biggest banking business in the whole country. The Savings Banks hold: through the Post Office, about 156 millions; through the Trustee Savings Banks, 53 millions; in deposits from the public, mostly from the working classes, a total of 209 millions. That money is all invested in Consols or Government securities, and there is no cash reserve held against those deposits; nothing beyond a very small amount of ordinary till money. I think myself, although opinions differ, that the State should keep a considerable reserve in gold against these liabilities. That is not the official view. Only last session the Chancellor of the Exchequer again expressed the opinion in the House of Commons that "the National Debt Commissioners keep such cash reserves as experience shows to be necessary for the requirements of the Savings Banks, that the conditions of the Savings Bank business are so different from those of commercial banking that he was unable to admit any analogy between the two cases in regard to the question of reserves." That is the official view which has been always expressed in the House of Commons. I differ from it altogether. I think in case of a sudden outbreak of war, in the case of our food supplies or supplies of material for our manufacturers not arriving as rapidly as in times of peace, there will be a lack of employment, and it is in that case that the Savings Banks of the people must be encroached upon by the people for their money. To meet such a case, a nucleus of a reserve in gold

should be formed which would be of great assistance in other matters as well. Then you come to the relations between the State and the Bank of England, which relations are of very considerable importance. As you are aware, the State is indebted to the Bank of England to the extent of eleven millions on which interest is paid, and that debt forms the basis of bank notes. If the State were to pay back eleven millions to the Bank, and the notes were issued against gold and not against credit, then a very great improvement in the position would take place, not at very great cost to the country. As has been said, I shall have an opportunity of further expressing my views on these matters before very long, and I am afraid I have already detained the meeting too long on this occasion, and therefore I ask you once more most cordially to thank Sir Robert Giffen for bringing this matter to your notice to-day.

STUDIES IN APPLIED TACTICS.

CAVALRY IN BATTLE (15TH AND 16TH AUGUST, 1870).

By P. LEHAUTCOURT.

Translated by permission from *Le Journal des Sciences Militaires*,

By Major E. MAKINS, D.S.O., 1st Royal Dragoons.

Continued from September JOURNAL, p. 1259, and concluded.

XIII.

THE GENERAL GERMAN ATTACK AT NIGHTFALL.

DURING the time that our offensive had been checked thus on the right, the situation in the centre had remained at a standstill since the charge of Bredow's Brigade. The arrival of fresh troops only furnished us with the opportunity for some counter attacks, which were almost at once checked by the fire of the German artillery. On either side there was no progress.

In front of our left, on the contrary, the arrival of portions of the VIII. and IX. Corps, led the Germans to push their attack in opposition to the views of Frederic-Charles, who proposed only to hold on to the positions already taken. Their check, which he had been partly able to ascertain with his own eyes, and the arrival in line of the Hessians on his extreme right, led him to take a momentous decision: that of proving to us by a general attack, that the Germans considered themselves masters of the field of battle. At 7 p.m. he ordered the X. Corps, Buddenbrock's Division of the III., the Duke of Mecklembourg's cavalry, and the general mass of artillery in the centre, to advance. It was a novel application of the "offensive to the knife" which had already given the Germans the moral superiority on this day, in default of that numerical superiority which they had been far from possessing.

But circumstances had changed since the first attacks of Alvensleben. The evening was far advanced, and the progress made by the Germans was no longer seriously contested. But could Frederic-Charles have hoped to have inflicted on us a complete tactical defeat, taking the situation as it was, at such a late hour? It seems not, and that, on the contrary, following

the maxim of Moltke, it might have been prudent not to provoke by new attacks an enemy who possessed an enormous numerical superiority. It was risking perhaps the advantages, so hardly won, since the arrival of fresh reinforcements could not be counted on.

Besides, the troops were exhausted and were almost without ammunition; the horses had not been off-saddled for fifteen hours, during which time they had not been fed. Some of the batteries could only move at a walk, and the XII. Corps, which was the nearest to the west of the Moselle, was still more than a day's march away.

On the left, since the check of the 38th Brigade the X. Corps was not at all in a condition to take the offensive. In the centre and on the right everything was limited to a demonstration. Colonel von Dresky, the Commandant of the Corps Artillery of the III. Corps, had received orders direct from Frederic-Charles to advance at once to Rezonville, and to avoid at the same time exposing themselves to the fire of our infantry. But a part only of his line was able to carry this out. Two batteries of the X. Corps before opening fire were taken in front and flank, and almost at point blank range, by some parties of infantry, who had not been observed. In spite of considerable losses they opened fire, but the majority of the batteries were incapable of moving, having no teams.

In the centre the infantry tried to follow up this artillery. Some of the 35th, the remainder of the 1st and 3rd Battalions of the 20th marched to Rezonville, moving by the north of the Mars-la-Tour road. At one moment the Prussian batteries crowned the crests immediately to the west of Rezonville. But we had there very considerable forces of infantry, and behind them the numerous artillery of General Bourbaki, 54 guns. From the north and the east the assailants were received by a murderous fire, which obliged them soon to retreat. Some of their batteries were obliged to fire case, in order to extricate themselves.

Meanwhile the 6th Cavalry Division had left its position in the fold of the ground to the south-west of Flavigny. Grüter's Brigade (3rd and 4th Squadrons of the 3rd Uhlans, 15th Uhlans, 1st, 2nd, 3rd Squadrons of the 6th Cuirassiers) went along the Buxières road in order to reach Rezonville. They were formed in squadron column, the two squadrons of the 3rd Uhlans in the first line, the remainder following at 200 metres distance. A divisional cavalry regiment, the 12th Dragoons, secured the right of the second line. Night had already fallen; it was only possible to be guided by the flashes of the guns and rifles. The Brigade in this formation passed through the German artillery, but soon ran up against strong masses of infantry (?) whose fire inflicted on it considerable losses.

This semblance of a charge had met a portion of the 51st (1st Battalion), which had retired on the 1st Light Infantry of

the Guard (1st Battalion) at the moment when the latter were actually moving. The infantry formed square and opened fire at a short range on the two columns of cavalry, each estimated at two squadrons, and the latter took to flight in the greatest confusion.

The Battalion of Chasseurs of the Guard also had the opportunity of firing at "100 yards range" on the Uhlans of Grüter's Brigade, who were put to rout. The 2nd Battalion of the 4th Light Infantry, which had just crowned the crest to the south-west of Rezonville had the same opportunity. The hostile squadrons appeared at 300 metres distance, but some independent fire threw them into disorder. General von Grüter was mortally wounded.

The Hussars of Rauch's Brigade, then commanded by Colonel von Schmidt, also formed in squadron column, and passed to the north of Flavigny and marched on Rezonville, crossing the Mars-la-Tour road. At this moment the Prussian infantry thought that they were threatened by our cavalry, and fired quickly in all directions, not without damage to friendly troops, as can well be imagined. This mistake perhaps was caused by the 5th Regiment of Chasseurs of Valabrègue's Division, who at 7 p.m. got the order to show a front to an infantry column coming from Vionville to Rezonville. The Chasseurs, being received by an extremely sharp fire, retired behind the 93rd. Darkness and the fatigue at the end of the day's fight fully explain the confusion reigning on both sides.

After having passed through the Prussian infantry, Schmidt led his whole Brigade to the north of the road and started at the gallop to charge a mass which was hardly visible in the darkness and which disappeared at once to the right. A moment afterwards the Hussars found themselves in the middle of infantry, who riddled them with bullets, but fired very wildly. Part of La Fond de Villier's Division fled to the Pierrot wood; the colours of the 91st were in danger, as well as General de Sonnay. A regular avalanche of men of the 91st and 93rd bore down on the 94th and threw it into complete disorder. In the 70th there was also a general panic. A part of Schmidt's Brigade continued on till they met Valabrègue's Division, which received some of the projectiles destined for the hostile cavalry. The repeated trumpet sounds of the Army Corps, and the calls of "Cease fire" sounded by the trumpeters of the Division put an end to the mistake.

The darkness, and the fatigue of the horses, was such that Schmidt's Brigade was unable to profit by this confusion, the extent of which it certainly did not suspect. Schmidt had been wounded, and the Brigade rallied to the north of the road.

Certainly this attempt does not demonstrate that night attacks are practical for cavalry. If there is an arm for whom they are practically forbidden it is certainly this one. The hour when Grüter's and Schmidt's Brigades charged was much too late; but having made this observation, it must be recognised

that in spite of the exhaustion of the horses, who had been saddled up since 2,30 a.m., the bold attack of the Prussian squadrons produced a considerable moral effect. An eye witness writes that "it was almost night, and we thought the day was finished when the Division (Forton) formed up suddenly in line with drawn swords between Rezonville and Vionville. A low murmur at first, which suddenly grew into a tremendous clamour reached our ears. Soon we saw coming a mob of panic-stricken infantrymen."

Thousands of fugitives, soldiers who had left the ranks or had been wounded, huddled together round Gravelotte. Marshal Bazaine, in returning to his headquarters at 10 p.m., could hardly get through this immense crowd.

The cavalry had, in fact, taken advantage of the exhaustion resulting from a long day's fighting, and the reaction which ensued fatally in the evening.

Conclusions.

From the preceding study it will be seen that during the 16th day of August the cavalry had played a leading part from the beginning to the last moment of the fight. At one time, as in the case of Bredow's Brigade, it put the finishing touch to the success gained by the infantry and artillery; at another time, as in the case of Auerswald's Dragoons, it covered the retreat of the other arms. Often voices of ill-omen rise up to state that the constant improvement in armament forbids nowadays cavalry action on the field of battle. At the very outside is it admitted that it can reconnoitre for the other arms, and guarantee them against surprise. The battle of 16th August shows how little founded these assertions are. We have seen how a portion of Cissey's Division, after having defeated the 38th Brigade, and being in that state which follows on a success of this kind, was thrown into disorder by three squadrons of Dragoons skilfully led. Can it be believed that if the infantry of the 4th Corps had been armed with magazine rifles the result would have been very different?

Certainly not, and it seems that for cavalry the difficulty of charging infantry does not vary in proportion to the superiority of their arms. It relies above all on the *moral*, and on the physical exhaustion of the foot soldier. Even in the days of flintlocks infantry were capable of resisting cavalry charges in flat open country. Notably the Swedes had often proved it. But the first condition rests on the value of the *moral* of the troops.

Without doubt the possession of modern rifles gives the foot soldier great advantages, but only on the condition that he has still sufficient nerve force and coolness to be able to use them. If the infantry is seriously affected in its *moral*, in consequence of a check, or even after a long wearing-down fight; if it is physically exhausted; or if it is in the confusion which follows

almost fatally the taking of a position, it does not matter whether it is armed with the ancient musket or the magazine rifle. It will not know how to use it; often its fire will be even more dangerous to its friends than to its adversaries.

If the example of Auerswald's Dragoons and Bredow's Brigade does not appear to prove this point conclusively, it will suffice to recall that during the Soudan campaign fanatical bands armed almost entirely with spears and clubs, were seen to break the English squares defended with excellent rifles. Would the English not have been better off if they had been mounted and suitably armed?

Therefore, it is quite certain that cavalry will be able, as in the past, to attack infantry with success, but with the essential conditions, that it must skilfully select the right moment to attack, the right point of attack, and the covered way which will allow it to approach. Every charge for which the ground in front has not been rapidly reconnoitred, even if only with the eyes and from a distance, exposes cavalry to a check under fire, which spells disaster. Disaster will also occur if infantry, which is unshaken by loss, or which has been allowed time to recover, is charged in front. To use for the attack, geometrical and stiff formations, as our neighbours do in employing the *tactique des lignes*, is to renounce the use of one of the greatest advantages of cavalry against infantry, namely, its manœuvring mobility and its capability of rapidly changing its direction. Deployment must be delayed for as long as possible, and formations in column must be used, which fit in easily with the ground, in order to approach under cover, and gain unforeseen the enemy's flank. An attack thus conducted will be very advantageous, provided that it catches the infantry at close quarters, as Auerswald's Dragoons did with the first line of Cissey's Division.

Thus cavalry can charge infantry with effect if it can manœuvre and knows how to use the ground under their best conditions. A simple frontal charge, like that of the 3rd Lancers and the Cuirassiers of the Guard, has only a poor chance of success, even if it is pushed home, when the nature of the ground is not in its favour.

Against artillery the formation in column of squadrons, closed up to half distance, used by the 2nd Chasseurs d'Afrique, assuredly possessed very few advantages. It would have been preferable to have attracted the attention of Planitz's Battery by a frontal charge in extended order while the main body of the Regiment manœuvred, in order to take it in flank or even in rear, not forgetting the escort, which acted with the aforeseen results. The principle is the same as against infantry, viz., to attack the artillery under such conditions that it can only make the least possible use of its projectiles.

The 16th day of August, 1870, had witnessed the greatest cavalry engagement of the whole campaign, that of Ville-sur-Yron. We have attempted to show how sterile were the results.

The two opposing cavalries could have been better employed than in exhausting themselves in this immense "tournay," from which they retired for the time being *hors de combat*, with almost equivalent losses. The established rule in our old cavalry drill-book of "combination and unity of effort" is not the supreme law only in engagements between cavalry *v.* cavalry. It applies still more rigorously to the *rôle* of this arm in the battle when side by side with the other arms. The condition necessary to success lies in the constant co-operation of all arms, and in permanent combination in view of the crushing of the adversary. An engagement of cavalry *v.* cavalry is only justified if it enters into the general plan of the action, and if it can facilitate the offensive of the infantry. Ladmirault, when he threw all his available cavalry on August the 16th beyond the Fond de la Cuve to oppose a turning movement, which he believed would take place from seeing the battery and the squadron, was certainly wanting in moral courage. The two Batteries of du Barail's Division would have been sufficient to have checked this demonstration of the German squadrons on the La Grange wood, more especially as they had the advantage of a commanding position at the Grizières Farm. In case of need they could have been reinforced by some of the batteries of the 4th Corps.

Even admitting the necessity of the fight of Ville-sur-Yron, it would appear evident that we could have conducted it in a way less disadvantageous to ourselves. The dilatoriness of our preliminary movements made it possible for the Germans, who were greatly scattered, to concentrate nearly all their forces; the insufficient mobility of our squadrons allowed the enemy to repeatedly take them in flank. Lastly, we did not know any more than our adversaries how to make use of our Horse Artillery Batteries in the combat. All of which does not at all reach the ideal, which both cavalries had the right to expect. If, during the memorable day of August the 16th, there is an episode which will always merit deep thought, it is the Death-Ride much more than the great "tournay" of Ville-sur-Yron.

ON SOME FUNCTIONS OF THE PROJECTILE FROM A SURGICAL ASPECT.

By C. MARSH BEADNELL, Fleet Surgeon, R.N.

Continued from September JOURNAL, p. 1247.

HITHERTO we have considered velocity and energy of the bullet only in connection with its motion of translation; we must now examine its speed and energy of rotation.

The rotary energy of the modern bullet is a factor which the military surgeon cannot afford to despise; for instance, this energy in the Lee-Metford bullet at the commencement of its career is 17.2 ft. lbs.[1]

The muzzle velocity of rotation depends upon muzzle velocity of translation and screw pitch, and can be found by dividing the latter velocity by the pitch of the screw, thus for the Lee-Metford bullet the muzzle velocity of rotation is $\left(2{,}000 \div \frac{10}{12}\right)$, *i.e.*, 2,400 revolutions per sec.[2]

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[1] The energy in ft. lbs. of any bullet due to its rotation is :—

$$\frac{W}{2g}(rA)^2$$

In which W = weight of bullet in lbs.
,, r = radius of gyration in feet.
,, g = gravitation.
,, A = angular velocity in ft. secs.

Given the rifle we can state the energy of rotation of the bullet thus :—Let R. be the energy of rotation, p. the pitch of the rifling in ft., r. the radius of gyration in ft., w. the weight of the bullet in lbs., v. its velocity in ft. secs., and g. gravitation, then :—

$$R = \left(\frac{4\pi^2 r^2}{p^2}\right)\left(\frac{w v^2}{2g}\right)$$

[2] The linear velocity of rotation is the tangential speed of any point on the surface of the bullet, or the velocity with which such point revolves around the median long axis. For the Lee-Metford bullet the linear velocity of rotation is 190.3 ft.-secs., and is calculated as follows :—Let L. represent the linear velocity of rotation, r. the muzzle velocity of rotation, d. the diameter of the bullet in ft., then :—

$$L = \pi r\, d.$$

Angular velocity of rotation is the number of units of angular measure revolved through in one sec. A bullet making one turn in one sec. has an angle velocity of 2π or 360 degrees, hence, the Lee-Metford bullet has an angle velocity of $4{,}800\pi$ or 864,000 degrees.

Under the heading of *internal ballistics* we considered the projectile in its passage through the rifle, its course being then for all practical purposes a right line; we must now take up the question of *external ballistics* and study the behaviour of the projectile after it has left the rifle, and in this connection we must first consider the projectile in its flight through the air, *i.e.*, before impact, and, secondly, in its passage through the more or less solid medium, termed the objective, *i.e.*, after impact.

As the bullet enters the outer world it finds itself, so to speak, under very different conditions to those under which it existed before it was acted upon by the force of the explosion; it is now describing an orbit through space at high speed, it is rotating about an axis of magnitude with a velocity which may be anything between 144,000 revolutions and 257,000 revolutions per minute (the former in the case of the Lee-Metford and the latter in the Krag-Jorgensen), it possesses a high capacity for work, its surface is clean, bright and highly polished by the removal of the superficial layers of the sheath, it is furrowed by several parallel straight grooves, its temperature is raised, partly by the enkindled gases, and partly by the friction to which it has been subjected while coursing through the barrel; in consequence of this rise of temperature it is thoroughly sterilised, that is to say, is totally destitute of all living bacteria and their spores.

Standing behind a 12-inch gun one can easily follow the flight of the projectile with the naked eye. Under favourable circumstances and with the aid of a telescope it is possible to catch a glimpse of even the small-bore bullet as it flashes through the air. Photographs, or rather shadowgraphs, of the 0.311-inch bullet travelling with a speed of over 2,000 f.s. have been obtained, and they clearly show the cap of condensed gas, about one-tenth of an inch thick, which clothes the ogive of a projectile when it is in rapid motion through a gaseous medium. From the shoulders of such a projectile straight lines may be seen to diverge posteriorly, symmetrically to the trajectory; secondary divergent lines forming somewhat more acute angles, proceed from the basal cannelure—if present; the angles formed by these lines with the trajectory increase as velocity diminishes. Minute rotating spherules of gas showing vortical motion remain behind and map out the path of the bullet. These lines and eddies recall forcibly the bow and stern waves made by a ship in motion and the numerous little whirlpools that may be seen in its wake.

The sound made by the projectile as it courses through the air is a rough indication of its velocity. At low velocities the displaced air immediately glides in behind the base of the bullet just as the water displaced by the bows of a ship closes in behind the stern, and the sound emitted is a prolonged hum or whizzing note; at high velocities a vacuum is formed behind the posterior surface of the projectile and a sharp abrupt detonating noise, like the crack of parchment under tension, is heard, due to the collisions of the displaced columns of air. All who

have marked inside rifle-butts or who have been present in a "raking" ship at target practice afloat are familiar with the peculiarly sharp and abrupt noise made by a projectile in rapid motion.

The effect of rotation upon the flight of the projectile is extremely interesting and instructive. The rotations of the projectile may be divided up as follows:—

1. *Rotations in the vertical antero-posterior plane.*
   - *a.* Forward rotation about a long axis.
   - *b.* Forward rotation about a short axis.
   - *c.* Backward rotation about a long axis.
   - *d.* Backward rotation about a short axis.

2. *Rotations in the vertical lateral plane, i.e., in the plane at right angles to* 1.
   - *a.* Right-handed or clock rotation about a long axis.
   - *b.* Right-handed or clock rotation about a short axis.
   - *c.* Left-handed or anti-clock rotation about a long axis.
   - *d.* Left-handed or anti-clock rotation about a short axis.

3. *Rotations in the horizontal plane.*
   - *a.* Right lateral rotation about a long axis.
   - *b.* Right lateral rotation about a short axis.
   - *c.* Left lateral rotation about a long axis.
   - *d.* Left lateral rotation about a short axis.

The majority of these rotations, which may, of course, occur in any one of the three planes of space, are not normal to the bullet's flight, but are brought about by errors of propulsion, eccentricities of the bullet's conformation or structure, or by the reaction to impact, one or a compound of these abnormal rotations being invariably present in every ricochetted missile.

The revolution speed of the bullet does not decrease so rapidly as does the speed of translation, hence rotary phenomena are more marked at long than short ranges. In striking a person at an extreme range the bullet may enter the body but fail to emerge, rotating rapidly within the tissues until friction brings it to rest. That this rotation plays a significant rôle in the genesis of projectile injuries will not be denied by those who appreciate the significance of a rotary speed of 2,000 revolutions to 4,000 revolutions per second. Let us now consider these rotations somewhat in detail.

Forward Rotations.—The bullet rotates about a lateral horizontal axis, its equator of rotation moving in an antero-posterior vertical plane in such manner that a point on the most anterior part is, at any instant of time, advancing in a downward direction relative to a point on the most posterior aspect of the bullet which has a tangential direction upwards. These rotations are abnormal, being subsequently acquired by ricochet with the ground or other horizontal surface below the bullet.

Backward Rotations.—The projectile rotates about a lateral horizontal axis, its equator of rotation moving in an antero-

posterior vertical plane in such manner that any instant of time the most forward point is ascending relative to the most posterior point which is descending. These rotations are also abnormal, being acquired after the bullet has ricochetted off a horizontal surface *above* it.

Clock or Right-handed Rotations.—The bullet rotates about an antero-posterior axis in such manner that the equator of rotation is in a lateral vertical plane, and an observer situated behind the bullet, *e.g.*, the firer, would, if it were possible, note that the radii of revolution moved with the hands of the clock. This rotation, when it is about the bullet's median longitudinal axis, is the normal rotation imparted by rifles such as the Krag-Jorgensen with a right-handed twist.

Anti-Clock or Left-handed Rotations.—The bullet rotates about an antero-posterior axis in such a manner that the equator of rotation is in a vertical lateral plane, and the firer would see the radii of revolution moving against the hands of a clock. This rotation when about an axis of magnitude is normal to bullets fired from rifles with a left-handed twist, *e.g.*, the Lebel and Lee-Enfield.

Right Lateral Rotations. — The bullet rotates about a vertical axis, its equator of rotation lying in a horizontal plane with its most advanced point moving at any instant of time to the firer's left hand, its most posterior point moving towards his right hand. These are abnormal rotations caused by ricochet from a vertical plane to the left of the firer. If, however, a bullet with clock rotation undergoes a tilting motion so that it points upwards with its long axis hanging vertical, it is easy to see that the rotation normal to the bullet has been shifted from the vertical to the horizontal plane, so that the bullet, though still rotating normally as regards its own dimensions, now possesses right lateral rotation. This is the particular rotation that causes a drift to the right.

Left Lateral Rotations.—The bullet rotates about a vertical axis, its equator of rotation lying in a horizontal plane with the point most distant from the firer moving towards his right hand, the proximal point moving to his left. These are abnormal rotations produced by ricochet off a solid vertical plane on the firer's right hand aspect. If, however, a bullet with anti-clock rotation becomes so tilted that it points upwards, its long axis vertical, the rotation normal to the bullet has undergone transference from the vertical to the horizontal plane, so that, though still rotating normally as regards its own dimensions, the projectile now possesses a left lateral rotation. This is the rotation that causes drift to the left.

We have here enumerated merely the six primary rotations of the projectile in the three dimensions of space, but there remain innumerable rotations which are compounded out of one or more of these six fundamental kinds, for instance, there are the various "humming-top," "hour-glass," and "pirouetting" movements to which we will allude later when discussing the passage of the projectile through solid media.

Let us now consider the action of winds upon the rotating projectile. The first effect of an air current is obviously to induce motion in its own line of direction. When the wind is strong and from the side, and when the flight is prolonged, and especially when the bullet is attenuated in form and light in weight, this imparted motion is very considerable, thus at a thousand yards' range and with a sixty-mile-an-hour flank wind the Lee-Metford bullet undergoes 44 yards deflection.[1]

The second effect of air currents depends upon the species of rotation with which the bullet is endowed and is to induce a motion of translation whose direction is at right angles to that of the air current. The wind produces a cushion of condensed air in contact with that side of the bullet opposed to it; on the sheltered aspect of the bullet is a zone of rarefied air. The result of this is a difference of pressure upon the two sides of the projectile, and hence if the rotary motion be such that the circumference of maximum rotation passes through these alternate zones of condensation and rarefaction it must induce a movement of translation at right angles to the direction of the wind, on precisely the same principle that a billiard ball rotating in a vertical plane and dropped from a height of an inch or so upon the cloth will have a portion of its motion of rotation arrested and converted into one of translation. It will not be necessary here to do more than merely enumerate in tabular form the resultant motion of the projectile brought about by this reaction between its surface of rotation and the wind.

With cylindro-conoidal bullets possessing normal rotation about a long axis (clockwise in the case of rifles with a right-handed twist and anti-clockwise in the case of rifles with an opposite twist) it will thus be seen that the effect of a wind from the firer's right will be to cause the bullet either to ascend, in which case ranging power will be increased and the bullet will fly high of the mark, or to descend, in which case the bullet's ranging power will be diminished and it will fall short of its proper destination.

The bullet's energy of rotation is $4\pi^2 r^2$ divided by p^2 of the striking energy where r = radius of gyration in feet and p = pitch of rifling. This energy in a smooth-bore rifle would be expended in augmenting the muzzle velocity of translation, but unfortunately a bullet fired from such a rifle begins to rotate about a short axis within a few feet of the muzzle. What, then,

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(1). If the wind is blowing from left to right across the line of flight, it will give to the bullet a component lateral velocity in the direction of the wind and the resultant direction is $\tan -\left|\frac{V}{v}\right.$ where V. is the muzzle velocity and v. the velocity of the wind.

The amount of deflection can be calculated from the formula $D = v\left(t - \frac{r}{V}\right.$ where D is the deflection, v. the wind velocity, V. the muzzle velocity, r. the range and t. the time of flight.

Table III., showing the effect of air currents upon a projectile rotating about an axis of magnitude.

Direction of bullet's rotation.	Direction of Wind.	Resultant motion of translation imparted to bullet.
Rotation forward	From the front	Bullet ascends.[1]
,, ,, ...	,, ,, back	,, descends.
,, ,, ...	,, ,, right	No effect.
,, ,, ...	,, ,, left	,, ,,
,, ,, ...	,, above	Bullet recedes.
,, ,, ...	,, below	,, advances.
,, backward ...	,, the front	,, descends.
,, ,, ...	,, ,, back	,, ascends.
,, ,, ...	,, ,, right	No effect.
,, ,, ...	,, ,, left	,, ,,
,, ,, ...	,, above	Bullet advances.
,, ,, ...	,, below	,, recedes.
,, right lateral ...	,, front	,, goes right.
,, ,, ,, ...	,, back	,, ,, left.
,, ,, ,, ...	,, right	,, recedes.
,, ,, ,, ...	,, left	,, advances.
,, ,, ,, ...	,, above	No effect.
,, ,, ,, ...	,, below	,, ,,
,, left lateral ...	,, front	Bullet goes left.
,, ,, ,, ...	,, back	,, ,, right.
,, ,, ,, ...	,, right	,, advances.
,, ,, ,, ...	,, left	,, recedes.
,, ,, ,, ...	,, above	No effect.
,, ,, ,, ...	,, below	,, ,,
,, clockwise	,, front	,, ,,
,, ,, ...	,, back	,, ,,
,, ,, ...	,, right	Ascends.
,, ,, ...	,, left	Descends.
,, ,, ...	,, above	Bullet goes left.
,, ,, ...	,, below	,, ,, right.
,, anti-clockwise ...	,, front	No effect.
,, ,, ,, ...	,, back	,, ,,
,, ,, ,, ...	,, right	Descends.
,, ,, ,, ...	,, left	Ascends.
,, ,, ,, ...	,, above	Bullet goes right.
,, ,, ,, ...	,, below	,, ,, left.

are the objects of this rotation about the median long axis? They are:—

1. To give stability, thus keeping the point of the projectile more or less in the line of direction, and to increase penetrative capacity.
2. To diminish resistance.
3. To present the inevitable imperfections of surface to the atmosphere at all points.
4. To enable a greater mass to be fired without increase of sectional area.

[1] A driven golf ball that has been "topped," and which therefore we may regard as a spherical projectile with forward rotation under the influence of a "wind from the front," undoubtedly "ducks," as every golfer knows; but this remarkable phenomenon is open, I think, to another interpretation.—C.M.B.

At the instant an elongated projectile leaves the muzzle of a rifle there occurs a tremendous blast of gases past it, the gaseous particles having a much higher muzzle velocity than the projectile itself; now were it not for its stability acquired in virtue of its rapid rotation about a long axis the effect of these gases would be the production of a rotation about a short axis, in fact, experiment has proved that elongated projectiles fired from a smooth-bore rifle may be travelling "side on" at a distance of two feet from the muzzle, and this in spite of the fact that the smooth-bore bullet has, *coeteris paribus*, a much higher muzzle velocity.

If we watch an ordinary humming-top spinning on a smooth plate we see that at the commencement of its spin it is somewhat unsteady, its long axis generating a cone of which the frustum is the peg in contact with the plate; after a while the long axis assumes a perfectly vertical position and the top "falls asleep" and is apparently motionless; as the revolutions decrease in rapidity the top again begins to wobble until, finally, after some very erratic evolutions, it rolls over on to its side. Now a cylindro-conoidal bullet is nothing more nor less than an aerial top spinning many thousand times a minute about its long axis, its apex, corresponding to the peg of the top, rests upon a layer of condensed air, which may be likened to the plate upon which the humming-top spins; at first, owing partly to slight imperfections of the muzzle of the rifle, partly to the disturbing effects of the blast, the long axis of the bullet generates a cone in space of which the apex is represented by the extreme point of the ogive, soon, however, the projectile settles down into a condition of almost perfect stability and only begins to sway again towards the termination of very long trajectories. Screens interposed in the path of a bullet at various ranges prove that the aperture made at comparatively close range is somewhat larger than that at a moderate range, the largest holes being met with at the longest ranges. Fortunately for the stability of the bullet angular retardation is very slight as compared with the retardation of translation; in short, the projectile moves in a constantly increasing screw.

The resistance to a modern bullet's translation is the expression of work done in overcoming the inertia of air particles, thrusting them aside and imparting to them a definite velocity of translation and rotation; for instance, a 0.75-inch bullet weighing 583.3 grains has energy of 3,607 ft. lbs. at 25 feet from the muzzle, at a range of 75 feet its energy has fallen to 3,109 ft. lbs., hence in traversing 50 feet of air between the ranges 25 feet and 75 feet, 498 ft. lbs. of work are done upon air particles. This is equivalent to an average pressure of 9.9 lbs. continually thrusting the bullet backwards.

The conformation of the anterior and posterior extremities of the bullet are important factors as regards aerial resistance. Taking the resistance opposed to the tubular Krnka-Hebler bullet as unity it is found that:—

1.	Flat-headed projectiles have a resistance of	12.50
2.	Hemispherical-headed projectiles of ...	8.30
3.	Ogival-headed of one diameter of base of	6.90
4.	Hemispheroidal-headed of	6.50
5.	Ogival-headed of three radii of base ...	6.10
6.	Krnka-Hebler of	1.00

No definite expression of the relation existing between velocity and resistance has yet been found; up to velocities of 790 f.s. resistance varies as the square of velocity, between 790 f.s. and 990 f.s. as the cube of the velocity, between 990 f.s. and 1,120 f.s. as the sixth power of the velocity, between 1,120 f.s. and 1,330 f.s. as the cube of the velocity, and above speeds of 1,330 f.s. it again varies as the square of the velocity. These complex relations between speed and resistance seem to be connected with the formation of caps of condensed air in front of the projectile and partial vacua behind it. A bubble ascending through a fluid does not ascend in a right line but in a zig-zag fashion, that is, in a series of directions. This is owing to the gradually increasing pressure on the superior surface extending laterally and affecting one side more than another, the bubble-projectile consequently deviating from that side. It is conceivable, nay, probable, that a solid projectile has a somewhat sinuous course through the atmosphere owing to parallel causes, and although the amount of oscillation so produced may not be capable of actual measurement or even demonstration it may yet be sufficient to allow the projectile to make a series of scapements, as it were, from the cap of condensed air constantly forming and reforming in front of its apex; in this way it may be connected with the bizarre and inexplicable relationship existing between velocity and resistance.

The resistance of the air varies according to the area of section of the bullet, and, since the sectional area of an elongated bullet is circular it follows that when the bullet is travelling with its long axis lying at a tangent to the trajectory, resistance varies as the square of the diameter. Retardation of a bullet is the converse of its ranging power and is proportional to the area of its cross section divided by the weight.[1]

It is obvious that by narrowing the calibre of the projectile and maintaining its weight an increase of ranging power may be obtained.

A perfect bullet is a *concentric* body, the centres of gravity and form coinciding. Air cavities or vacuoles within the sub-

[1]Let D be the diameter and W the weight of a bullet, then $\frac{D^2}{W}$, represents the comparative retardation. $\frac{W}{D^2}$ is the sectional density of the bullet and is proportional to its ranging power or capacity for maintaining velocity. For instance, the $\frac{D^2}{W}$ of the Snider bullet is 4·855 as opposed to 2·831 for the Mannlicher; in other words, given equal velocities the Mannlicher bullet meets with but one half the retardation of the Snider.

stance of the missile whether in the nucleus or between it and the sheath render the bullet an *eccentric* body.

In saying that the ranging power is proportional to the sectional density it is assumed that the bullet travels point first with its axis of magnitude lying constantly at a tangent to the trajectory. A concentric bullet fired vertically upwards or downwards would fulfil these conditions and strike a horizontal plane lying respectively above or below the bullet apex first with its long axis at right angles to the plane, but a bullet fired in any other direction than the vertical would have its long axis at an angle to the trajectory tangent, and the angle thus made would be a constantly increasing one with increase of elevation; in fact, an elongated projectile fired vertically upwards would retrace its path and strike the ground base first.

One would expect the bullet when trajected horizontally to strike the ground exactly *side on*, for the effect of its rotation would be such as to maintain its long axis constantly parallel to the line of departure; practically, however, this is not found to be the case owing to atmospheric resistance, which acts on the bullet in somewhat the same way that it acts upon a dart or arrow. Let us make this point clearer; with cylindro-conoidal projectiles the resistance of the air is, of course, greater to the basal half than to the apical half, consequently directly the apex of the bullet gets above the trajectory, as it is constantly tending to do in virtue of its long axial rotation, the increased pressure upon the basal portion forces it back into the line of the trajectory and thus the combined effects of atmospheric resistance and rotation are such as to cause the projectile to assume a position intermediate to the two.

A cylindro-conoidal bullet advancing in this fashion through a resisting medium must therefore always have the greatest pressure thrown upon its antero-inferior aspect and this is the key to the solution of that most puzzling phenomenon called drift or derivation, concerning the mechanism of which there has been so much contention. In consequence of this relatively augmented pressure upon the bullet's antero-inferior aspect a portion of the rotary motion is transformed into translation, the bullet rolling, that is, drifting, to one or other side upon these cushions of air, the particular direction assumed depending solely upon the species of rotation.

Turn we now to the second and, to the surgeon at any rate, more practical division of our study of the subject of external ballistics, to wit, ***impact*** and ***penetration***.

When a projectile strikes its objective, work is done and is manifested in one of three ways: disintegration, partial or complete, of the objective, of the projectile or of both. Given a projectile of absolute hardness, smoothness and elasticity impinging upon an objective possessing similar transcendental characters the former would rebound off the latter with undiminished velocity and no work would have been done during impact either upon the projectile or upon the objective. If a

tennis ball and an egg respectively be thrown at and strike an individual we may note that the latter, that is to say the objective, compels practically the whole of the work to be performed upon the missile; in the case of the tennis ball this work is represented by the destruction of a small quantity of motion, in the case of the egg by the destruction of all motion and a good deal of cohesion. A lead bullet which will just perforate a human body without suffering in shape may fail to even penetrate the hide of a pachyderm, flattening itself out against it; in the former case most of the work has been expended upon the objective, in the latter case upon the bullet.

The mutual reaction between the projectile and the animal's body is evidenced by deformation, heating and change of inertia of particles of both the body and the projectile. If it is desired to ascertain the actual amount of work done by the bullet in traversing, say, a human being, the energy of the bullet as it emerges from the tissues must be deducted from its striking energy, the difference representing the amount of energy absorbed by the tissues; should the bullet fail to emerge we then know for certain that the whole of its energy has been expended in ploughing its way through the softer tissues, lacerating them, and in shattering the bones. In each of these instances it has, of course, been assumed that the bullet itself has undergone no deformation.

In war it is no uncommon thing for a bullet to perforate one, two, or more individuals, the work performed upon one man being approximately $\frac{1}{n}$th the work done upon 'n' men.

Whilst traversing the objective the projectile must excavate a tube whose cross section is equal to the cross section of the projectile; if the objective be rigid, as, for instance, a plate of bone, this tube remains open, if plastic, as in the soft tissues of the body, the tube may partially close, if liquid the tube closes quickly and completely. When the apex of the projectile comes into contact with the surface of a solid body it throws into a state of compression those particles in immediate contiguity; surrounding this zone of approximated particles is an area of particles in a state of extension or tensile stress. As the strains set up by the bullet increase, the limit of elasticity of the particles in this strained area is ultimately overcome and the resulting solution of continuity allows of the passage of the bullet, capped by a certain number of highly-compressed particles, through the solid structure.

In the case of plastic or semi-solid materials the mechanism of the perforation is not quite so straightforward. In perforating skin, muscle, membranes, etc., the apex of the bullet first excavates a cup-shaped depression into which it insinuates itself; the zones of compression are now chiefly around the shoulders of the bullet and extend forwards and outwards in every plane. Anterior to the extreme point of the ogive is a small zone of extended particles resulting from the stretching of the tissues

over it; the centre of this zone soon ruptures and into the minute opening so formed is thrust the apex of the bullet. Forcing its way onward the bullet, in virtue of its wedge action, dilates this opening and, if the constricting collar of tissues be not sufficiently elastic to allow of the bullet's passage, it becomes ruptured at four equidistant points by small rents extending radially outwards; thus are formed four moveable sectors which first bend outwards and then spring back to their original position, practically closing the aperture directly the bullet has passed.

As has already been indicated, the bullet, in traversing the tissues of the body, expends its energy in modifying the motion, destroying the cohesion and raising the temperature of the molecoles not only of the tissues but of the bullet itself.[1]

The higher the velocity and the harder the bullet the more localised are the stresses produced and the more chance is afforded the bullet of neatly perforating hard structures such as bone, and the less liable is it to suffer from the effects of its own energy. A bullet thrown by the hand will shiver a window-pane to fragments, the same bullet fired from a rifle will punch out a small hole. The work done by a bullet in traversing such a structure as bone is proportional to the product of the circumference of the missile into the thickness of bone perforated when the incident angle is a right angle; if perforation be effected at an oblique angle the work done is proportional to the direct perforation into the sine of the angle of incidence.[2]

The modern bullet will perforate and refuse reflection at a much more acute angle than the older bullets, which were turned aside at an angle of 70 degrees. The critical angle depends upon the material of the objective and upon the shape of the projectile's head and also upon the velocity and mass of the bullet. After reflection off a plane surface the angle of reflection is greater than the angle of incidence and their respective planes do not coincide, but form an angle on account of the change of direction set up by rotation at the moment of impact.

Table IV. will give an idea of the comparative perforative powers of various bullets in gaseous, liquid and solid media. The perforation of air, that is to say the maximum theoretical range, has been calculated by means of Bashworth's formula and is quoted for the sake of comparison only, for in practice such enormous distances are never realised owing to the bullet's horizontal motion being arrested by contact with the ground. All the remaining perforations have been obtained by taking actual measurements of the bullet's track through the various

[1] The amount of *work* done by the bullet within, and upon the human body, is in the absence of deformation of the bullet, $\frac{W(V-V')}{2g.}$ where W. is the weight of the bullet in lbs., V. the velocity of entrance, and V'. the velocity of emergence in ft. secs., and g. gravitation.

[2] Let d. be the bullet's diameter and T. the thickness of bone perforated, and W. the work done in effecting this perforation, then $W = \pi d T^2$.

media. The measurements 12 to 20, excluding 15, were calculated from previous measurements of tracks made with bullets travelling at reduced speed.

TABLE IV.

Showing Comparative Power of Perforation of Bullets.

	Bullet.	Weight in Grs.	Velocity in Ft. Secs.	Diameter in Ins.	Perforation in Ft.	Medium.
1.	Mossine	310	2035	0·278	39,600·00	Air.
2.	Mannlicher	162	2395	0·315	23,400·00	,,
3.	Springfield	500	1301	0·450	22,500·00	,,
4.	Martini-Henry	480	1315	0·450	21,900·00	,,
5.	Lebel	216	2073	0·322	20,100·00	,,
6.	Remington	400	1380	0·440	19,800·00	,,
7.	Lee Straight-Pull	112	2489	0·243	18,900·00	,,
8.	Vetterli	310	1430	0·408	17,400·00	,,
9.	Express	1882	1450	1·052	15,600·00	,,
10.	Express	480	1780	0·577	13,800·00	,,
11.	Winchester	45	1137	0·220	8,400·00	,,
12.	Lee-Metford hard nose	215	2008	0·311	30·00	Bone, cancellous
13.	Remington, hard nose	409	1380	0·440	20·00	,, ,,
14.	Lee-Metford, hollow nose	200	2100	0·311	19·00	,, ,,
15.	Lee-Metford, hard nose	215	2008	0·311	18,00	Water.
16.	Remington, soft nose	400	1400	0·440	17·00	Bone, cancellous.
17.	Lee-Metford, soft nose	200	2100	0·311	16·00	Muscle.
18.	Remington, hard nose	409	1380	0·440	15·00	,,
19.	Remington, soft nose	400	1400	0·440	14·00	,,
20.	Lee-Metford, hollow nose	200	2100	0·311	8·00	,,
21.	Lee-Metford, hollow nose	200	2100	0·311	6·00	Water.
22.	Lee-Metford, hollow nose	200	2100	0·311	4·58	Pine, with grain.
23.	Remington, hard nose	409	1380	0·440	3·33	,, ,,
24.	Lee-Metford, hard nose	215	2008	0·311	2·50	Pine, against grain.
25.	Remington, hard nose	409	1380	0·440	1·83	,, ,,
26.	Lee-Metford, soft nose	200	2100	0·311	1·50	Pine, with grain.
27.	Lee-Metford, soft nose	200	2100	0·311	1·25	Pine, against grain
28.	Lee-Metford, hollow nose	200	2100	0·311	1·22	Sand, dry.
29.	Lee-Metford, hollow nose	200	2100	0·311	1·20	Sand, moist.
30.	Remington, soft nose	400	1400	0·440	1·00	Pine, with grain.
31.	Lee-Metford, hollow nose	200	2100	0·311	·99	Paper, in leaves.
32.	Lee-Metford, hard nose	215	2008	0·311	·93	,, ,,
33.	Lee-Metford, hard nose	215	2008	0·311	·83	Bone, compact.
34.	Lee-Metford, hollow nose	200	2100	0·311	·75	Clay, moist.
35.	Remington, soft nose	400	1400	0·440	·60	Sand, dry.
36.	Remington, soft nose	400	1400	0·440	·58	Sand, moist.
37.	Remington, hard nose	409	1380	0·440	·57	Bone, compact.
38.	Lee-Metford, soft nose	200	2100	0·311	·55	Paper, in leaves.
39.	Lee-Metford, hollow nose	200	2100	0·311	·50	Bone, compact.
40.	Remington, soft nose	400	1400	0·440	·41	,, ,,
41.	Lee-Metford, soft nose	200	2100	0·311	·33	,, ,,
42.	Lee-Metford, hard nose	215	2008	0·311	·14	Lead, in slab.
43.	Lee-Metford, hollow nose	200	2100	0·311	·12	,, ,,
44.	Remington, hard nose	215	2008	0·311	·11	,, ,,
45.	Remington, hard nose	409	1380	0·400	·10	Copper, in sheets.
46.	Lee-Metford, hollow nose	200	2100	0·311	0·8	,, ,,
47.	Remington, soft nose	400	1400	0·440	0·6	,, ,,
48.	Lee-Metford, hard nose	215	2008	0·311	0·2	Steel, in plates.
49.	Remington, soft nose	400	1400	0·440	0·1	,, ,,

In the older days of low velocity bullets with feeble penetrative capacity, contusions were not infrequent; now they are seldom seen. The writer, when in Malinta in Luzon, once saw a most curious injury in the person of an American trooper who presented himself with an enormous black bruise involving the whole of the front of his trunk, the skin being unbroken at any point. When his faintness and partial collapse had passed off he described what had happened. It seems that he had gone into action with a small 3-16ths-inch steel plate sewn into his nether garments at a point just in front of and below the left nipple, obviously with the intention of protecting his heart; fortunately, however, the steel plate had worked its way downwards and was struck by a Mauser bullet as it lay over the stomach. In this case, instead of the projectile tunnelling out a small hole through the man's body and travelling far on into the country beyond him, it used up the whole of its energy as destructive work done partly upon itself and partly upon the steel plate and a large area of skin and subcutaneous tissues.

Two bullets of different calibres but possessing equal energies do not transmit, in the absence of deformation, equal quantities of energy to equal areas of impact; the larger bullet experiences more difficulty in perforation, and may even stop inside the body, expending therein the whole of its energy, while the projectile of more reduced calibre, having done but a small amount of work within the body, emerges from it and continues its course. Hence it will be seen that if we wish to expend more energy upon the objective, in other words, increase the "stopping" power of a bullet without reverting to the old large-bore bullets, we must either diminish the pitch of the helix and so lessen the bullet's stability that the slightest shock will engender a rotation about a short axis, and thus offer to the resisting tissues an increased area of disturbance, or else we must adopt less rigid and more easily deformable projectiles which, after penetration, will flatten out, thus suddenly offering a greatly increased surface of impact.

The Russian Mossine bullet, which has a penetrative energy of 3,304 ft. lbs. per inch of circumference, has been known to perforate seven men at a range of 600 metres. In some exhaustive experiments made in France with the Lebel bullet, which has a penetrative energy per inch of circumference of 2,068 ft. lbs., upon human cadavers placed in series, it was found that:—

At 300 metres four men were perforated, the bullet lying in the fifth.

At 500 metres three men were perforated, the bullet lying in the fourth.

At 1,000 metres two men were perforated, the bullet lying in the third.

At 1,700 metres one man was perforated, the bullet lying in the second.

The penetrative energy of the Martini-Henry and Lee-Metford bullets is respectively 1,373 ft. lbs. and 2,004 ft. lbs. per inch of circumference.[1]

Heat phenomena due to impact with the tissues are very slight. If a modern bullet be fired at a bag of gunpowder backed by a steel plate, it fails to ignite it. On the other hand, heating of the projectile by friction with the rifle and contact with the enkindled gases is considerable, being above the boiling point of water, and quite sufficient to effectually sterilise it. The spores of anthrax, however, smeared on the surface of revolver bullets have been known to inoculate susceptible animals when these bullets were fired into them.

An "expansive" bullet is one which deforms readily during the perforation of moderately resisting structures, such, for instance, as the soft tissues of the human body. The word *expansive* is unfortunate, there being no real expansion, but merely an enlargement of one diameter at the expense of another; *deformative*, if one may coin the word, would surely be better. All lead bullets are deformative and mushroom during the perforation of moderately resisting structures, that is, the fore part of the bullet first meeting with resistance is temporarily checked, and the after part continuing its course telescopes into it, bulging it out laterally. Hence a bullet with a short diameter of 0.450 inch may be readily converted into one with a diameter of one inch. In sheathed bullets this deformation is not so readily brought about unless the mantle be weakened at certain points; this may be done by making the apex hollow as in the Mark IV., by longitudinal splits as in Jeffrey's sporting bullet, or by removing the sheath altogether from the apex as in the soft-nosed bullet. In this way the posterior rigid portion of the bullet is forced into the partially arrested weakened anterior part, and the sheath becoming split longitudinally, opens out like the petals of a flower, and with rapidly revolving blades, it cuts and tears its way through the tissues, producing the most terrible injuries.

Deformations of the projectile may be classed as:—

1. Torsions.
2. Shears.
3. Flexures.
4. Crushings.
   - *a*. Lateral—flattening.
   - *b*. Antero-posterior—mushrooming.
5. Lacerations.
6. Fragmentations.
7. Dislocations.
   - *a*. Partial.
   - *b*. Complete.

[1] Let P.W.V.D. represent the penetrative energy, weight, velocity, and diameter of the projectile respectively, then $P = \frac{W V^2}{2 g \pi D}$

Separation of mantle and core is by no means uncommon in the use of bullets whose sheath has been purposely weakened at one or other point. Sometimes the sheath is left behind in the barrel of the rifle, with the consequence that when the next round is fired the bullet jambs and the rifle bursts; more frequently, however, the sheath and nucleus part company outside the rifle. At Modder River the writer picked up three empty sheaths and one free nucleus. Dislocation of the nucleus from the sheath has been known to occur within the body, the nucleus passing out at one point and the sheath at another, or the former emerges leaving the latter behind. When an apparently straightforward gunshot wound festers and refuses to heal, the surgeon should bear in mind the possibility of such a separation and the use of the "X" rays will doubtless show that the entire bullet has not passed out. When using hollow-nosed and split bullets for sporting purposes the writer came across many instances of the disassociation of core and mantle and he possesses a piece of rhinoceros hide in which are firmly embedded, about three inches apart, two pieces of the sheath of a hollow-nosed bullet which had entered the animal's leg and broken up whilst traversing the bone. The nucleus, by reason of its greater momentum, had passed out, the fragments of the sheath remaining fixed in the hide.

(To be continued.)

DEFENCE OF HARBOURS BY FORTIFICATION.

By Brigadier-General R. F. JOHNSON, C.M.G., R.A.

Continued from September JOURNAL, p. 1272.

CHAPTER II.

THE ATTACK ON THE SEA FRONTS.

I.—*Attack by Fighting-Ships.*

THE difference between coast defence and harbour defence has not been sufficiently recognised, and consequently with us, as it has been charged with both, the army has been inclined to claim a preponderating voice in the decision as to the amount and nature of the fortifications, and has been encouraged to do so by the popular idea that fortification is a matter which can only be dealt with by engineers.

But once the true position of harbour defences as means of naval warfare is acknowledged, it is obvious that the navy is entitled to predominate, because it is more nearly concerned, can better estimate the scale and nature of the attack to be expected in each case, and alone can say for what period of time any particular fortress may have to resist without naval succour in order that plans of campaign shall not be upset.

It would be indiscreet to disclose the *data* considered applicable by our Admiralty, but fair deductions can be made as to the scale of attack from those conditions of naval warfare, which are apparent to any thoughtful student.

It can never be worth a combatant's while, whether he be the weaker or the stronger, to expose any considerable portion of his naval strength to the damage certain to be sustained from modern ordnance in forts. In the days of wooden sailing-ships the injured could be quickly replaced by new ones, or by converted merchantmen, and there were generally periods of cessation of hostilities on account of stormy seasons which facilitated restoration; but such conditions no longer exist, and fighting-ships are now assets of sea power too valuable and too difficult to replace for them to be risked in enterprises, of which the object can be otherwise attained. In fact, the amount of fortification required to deter an attack by ships can be safely said to vary inversely to the local facilities for one by troops or landed parties.

As cannot be too often repeated, the primary aim of every navy must be to gain or dispute the command of the sea. Whether disparity of force exists before the commencement of hostilities, or results subsequently from battle between the armoured ships, does not matter. The superior, if it does not destroy or capture all its enemy's vessels—an unlikely contin-

gency—will have to employ its main body in watching and keeping in subjection those that still exist, while the inferior will have to preserve its fighting force, either to be ready to take advantage of any division of its adversary's that circumstances or faulty strategy may bring about, or to retain the moral influence conferred by a fleet in being, which is undoubtedly of great value.

Nothing is better calculated to give the inferior navy a chance than the disablement in a fight with forts of some of the ships of the superior, and there can be no profit to be gained by the latter commensurate with the risks of such an undertaking, especially if its own important harbours are sufficiently fortified to resist for a limited period the raiding attack of any small squadron that may elude blockade.

There appears to be only one case in which it might possibly be worth the while of a very superior navy to attack a defended harbour, and that is where it shelters commerce destroyers giving trouble on the trade routes. But here two conditions are necessary:—(1) It must be reasonably possible to effect the purpose with an amount of damage which will not affect the relative fighting power of the combatants; and (2) the sacrifice involved must be cheaper in the absorption of strength than the observation of the harbour and the patrolling of the routes. Such an enterprise can only be a matter for a small detachment. In 1761 we took Fort Royal, Martinique, because it was being used as a base for privateers.

On the other hand, it has been suggested that an inferior navy, unable to accept battle, has a chance, if it can evade its adversary, of reducing the disparity of force by damaging his bases, or the ships lying at them. A great deal depends on the "if," but granting the possibility it again must be a matter for a detachment, because the main body or a large squadron cannot be expected to get clear. Supposing, however, it did, could it risk injury to its fighting efficiency from the fire of forts, when it must reckon on the almost certainty of having to sustain at least a running action at sea before again reaching its own harbours? Take this case: If Portsmouth were damaged, but the attacker's fleet, crippled in silencing the forts, were unable to reach home; we should have several other bases to go on with, and Portsmouth would be in working order again long before the ships could be replaced. It is even doubtful whether an attack by an inferior navy on an inadequately defended harbour in favourable circumstances can be considered correct strategy.

Disregard of fundamental rules in war always, sooner or later, brings its own punishment, but nations, with whom naval warfare is a secondary consideration, may be tempted to it by the possibility of temporary success. Therefore, the efficient fortification of all harbours whose injury may affect the power to carry on war, is necessary; but as a rule the attack to be provided against is one of a squadron of limited size.

The fighting strength of a navy lies in its armoured vessels; all others are only auxiliary. Battle-ships are too valuable to be risked in any enterprise which does not promise advantage in the struggle for supremacy. They need not, therefore, be expected to be employed against any harbours but those containing dockyards and refitting facilities, which are of first class naval importance. Armoured cruisers, owing to their greater speed and larger radius of action, which increase their chance of regaining their base without having to fight other ships, may raid against harbours of secondary naval importance; but they are now ships "fit to lie in the line," and their proper duty is to fight in company with the battle-ships. To employ them in the attack on commerce, especially in the form of assaults on defended commercial harbours, would be quite a misapplication of force.

The chief business of unarmoured cruisers[1] is the attack and defence of commerce, and it is clear that they will be strictly confined to it, if naval harbours are armed to deal with armoured ships.

No doubt, if a cruiser got into a commercial harbour she might do very considerable damage, especially if the trade of the port were one of importance to the national life. Modern ships, however, cannot be "cut out," and, as the Dutch recognised in the XVIIth century, the destruction of merchantmen only means loss to one's enemy, whereas their capture means profit to oneself as well. Then, too, capture on the high seas involves no risk from armament, and none of the dangers of navigating narrow waters. Consequently, a very moderate defence of commercial harbours is calculated to direct the energies of commerce-destroyers to the more profitable form of action.

If an attack should be made on a commercial harbour, it will certainly be one by very few ships, scarcely ever more than one or two, because the character of this branch of naval war renders dispersion of the cruisers imperative, both to cover the trade routes and to evade the armoured ships of the enemy.

There are exceptions to most rules, and there are cases of commercial ports to which it is desirable to give an armament strong enough to ward off armoured ships. Sometimes political considerations may be the reason, but the commonest examples are places where war-ships are built and warlike stores manufactured. These are of naval importance; but the heavier fortification is only required when the yards and works can be bombarded, for valuable fighting ships will not be sent up narrow waterways in which they cannot turn without assistance, and no ship could do really serious injury to plant without sending parties ashore, which a small garrison could prevent.

[1] Which as permanent units of navies seem to be dying out, but will probably be replaced by armed merchantmen.

General Sir Andrew Clarke wrote in 1890: "Defences are not required to resist the attack of the main body, but to repel the light cavalry who may pass round the rear of our only real line of Imperial defence—the Navy."[1] Although this dictum cannot be accepted quite literally, and one is entitled to doubt whether its distinguished author would have been content to fortify a naval base on a scale only calculated to resist unarmoured cruisers, still, it is safe to assume that in future ships will never attack a harbour in large numbers.

Exception must be taken to the following statement in "Garrison Artillery Training"[2]: "The scale of fixed defences necessary to protect the shores of an inferior naval Power will be higher than that needed by a Power superior in that respect." This clearly from the context refers to harbour defences, and contains two errors: (1) they have nothing to do with the defence of shores; and (2) the scale of fortification does not depend on relative naval strength, because, although the stronger fleet may be able to afford a larger detachment for a side issue, it has much less temptation to engage in one.

No doubt harbours of inferior navies which are distant from home may require fortification on a scale somewhat above the normal, because the value to be gained from their disablement as a means of war is increased by their fewness and the consequent size of the sea area dependent on each. But the distribution and plans of a superior navy may also cause distance to have the same effect in the case of its distant ports, because the liability to attack depends a good deal on the factor of time. It is certain, however, that the effect of distance has been very much lessened by steam and telegraphs, for it was the prevalence of certain winds and the absence of means of getting timely information that created the opportunities so frequently used in the XVIIIth century.

The fortification of harbours acquires a doubtful value, and therefore becomes proportionally extravagant, as a navy is weak, the reason being that it is only a means of delaying one's enemy's action until circumstances become favourable. If there is small chance of this occurring, defended harbours unlikely to be attacked can contribute little to naval power.

II.—*Attack by Torpedo Craft.*

If submersibles are used to attack harbours they will have to be opposed by the floating defence supplied by the navy, for their hulls cannot be hit by guns, and the chance of disabling them by hitting the periscope is too small to be taken into consideration. But for dealing with torpedo-boats or destroyers, fixed defences have an advantage over any form of floating, if it is only because the boats cannot injure them, though the

[1] "Fleets and Forts." A short paper.
[2] Vol. I., Ch. VII., Sec. 27, revised.

increase to rapidity and accuracy of fire given by stable gun platforms and fixed electric lights prevents any comparison.

In "Garrison Artillery Training"[1] we read: "The direct attack by torpedo craft of ships lying in a defended port or of dock gates, stands on a different footing to the attack of batteries by a fleet, and is a highly probable contingency, especially on, or even just before, the outbreak of war. An enemy will not hesitate to risk his torpedo craft freely in such an enterprise, if there should be any fair chance of success. Attacks of this nature will, however, probably be confined to the points where the assailant may expect to find hostile ships of war. Torpedo craft are too valuable to be risked in raids on commercial shipping which, even if successful, can exert but little influence on the course of a war. Successful attacks on a battle squadron, on the other hand, may produce results of so decisive a nature as to affect the whole strategical situation in a day, and require in consequence to be most carefully guarded against. (*Vide* Port Arthur 8/2/'04.)"

No one will dispute the truth of the above, but the example of Port Arthur may be used in another sense. The Russian ships on the 8th February were lying outside the anti-torpedo-boat defences, and the Japanese fleet had no decided superiority at the time. If the ships had been inside the harbour the value of torpedo craft for completing a naval victory—as evidenced in the battle of the Sea of Japan—is so great that it is by no means certain that they would have been exposed to certain damage for a doubtful result. Admiral Togo made no determined attack with his boats later on, although he felt unable to send his ships home to prepare for Rodjestvensky's arrival until he had satisfied himself by reconnaissance from 203-Metre Hill that all the Russian ships had been sunk.

A really superior fleet has good reason to expect to be able to effect its object without taking extraordinary risks, and it is not likely to forget that torpedo-boats can only destroy, and that capture is more profitable. An inferior fleet must take risks; and so it comes to pass that anti-torpedo-boat defence is of importance to a nation in proportion to its naval strength.

In addition to the risks to the boats, the fact that they can only injure ships lying in the stream or outside docks, and the danger of injury to neutral vessels raising International difficulties, are reasons that make their attack on commercial harbours injudicious and unlikely.

Within a large margin, depending on many factors and quite incapable of being fixed for general application, the liability of any harbour to attack may be gauged by its distance from the possible bases of the boats; but in some instances the base should be taken to mean little more than repairing ships and colliers.

As to the scale of attack, that is the number of boats that may be expected to act at one and the same time, those in the

[1] Vol. I., Ch. VII.

best position to judge seem the least inclined to give an opinion. Twenty boats can travel as far and as fast as two; but the numbers will probably always be limited, because:—(1) Surprise is almost essential to success, and a small number of boats is more likely to escape notice at all stages of the enterprise. (2) To send in more boats abreast than there is room for at the narrowest part of the entrance, would be to incur great risks of collision and confusion, while a long column is likely to be stopped by the disablement of one or two of its leaders. (3) Weather and other accidents of the sea make the co-operation of large numbers very uncertain.

At Wei-hai-wei, in 1895, the Japanese employed flotillas, each composed of five boats, which seem to have acted only one at a time. At Port Arthur on 14th February, 1904, they sent in four boats, but of these only two reached the harbour mouth, and there was an interval of two hours between their arrival. Generally the boats appear to have been divided into flotillas of three or four, and the only concentrated attack would seem to have been that made by five flotillas on the *Sebastopol* on 15th December, when she was outside the harbour entrance. No topographical reasons for not using larger numbers are apparent at either place.

It seems that three columns, each of six boats, may be taken as an outside estimate with conditions most favourable to the attack, and as one that will be seldom reached.

III.—*Attack by other Vessels.*

Combined with a torpedo craft raid, if a boom has been put across the entrance, there may be an attempt to break a way through it by smashing it with the charge of a vessel much larger than torpedo craft, but of small value compared to the profit expected from the enterprise. No boom can be used which is strong enough to withstand the impact of even a small ship, and consequently, provision must be made to stop the approach of these "boom-smashers."

A harbour may be rendered useless, or ships confined in it, by blocking the entrance or the channels of approach by sinking ships in them. The Dutch are said to have contemplated stopping the outlets from the Thames in this way in 1673, and attempts to shut in ships have been made in recent years at Santiago and Port Arthur. The liability to this form of attack depends on the channels being narrow and shallow enough, and on whether the spots suitable for sinking the "blockers" are within the range of the defences, which is decided by the effective range of the electric lights, as, for obvious reasons, the operation will generally be carried out by night. The effect can only be temporary, unless the attacking force can keep the sunken ships under fire, and consequently blocking is of doubtful value to an inferior navy.

The number of blockers employed is more a matter of expense than anything else. At Port Arthur, where the entrance

was 600 yards broad, three attempts were made. At the first five steamers were used of from 1,063 to 2,934 tons; two reached the entrance and were sunk on the western side of the channel, the other three ran ashore. At the second four steamers of from 2,692 to 2,943 tons were sunk in the channel, two of them by Russian torpedo-boats; but they lay nearly end on, and the result fell short of success. At the third the number was increased to eight; the leader smashed the boom, and was sunk by her crew in the fairway; a second passed the boom, and sank parallel to it; three more were placed in useful positions, and there is reason to believe that the operation was temporarily successful.[1]

It has been suggested that obsolete armoured ships might be used for this purpose, which would certainly increase the difficulty of stopping them before they reached suitable positions, and also the time required for their removal; but armoured ships so obsolete as to be used in this manner would not have much steaming power, and consequently the difficulty of getting them to the place will, at any rate on the side of an inferior navy, cause the use of merchantmen filled with cement, or otherwise prepared. The object of the defences is, of course, to prevent the ships ever reaching the favourable spots, and sometimes this must be done by a floating force, owing to their being beyond the range of the fortifications.

Both combatants may make the neighbouring waters dangerous to the other by sowing them with automatic mines. As the range at which this can be done is great, it is a form of hostilities beyond the scope of fortification, though on the part of the defence the fixed defences may prevent the removal or destruction of the mines, if they are laid near enough.

Beside being used as boom-smashers and blockers, merchant vessels may conceivably be loaded up with explosives, and rushed into a harbour with the idea of destroying dock gates, etc., by exploding alongside them. When so employed the old name of "fire-ship" seems very applicable, and one is rather wanted because the method of guarding against their attempts is not quite the same as that against blockers, an examination service being necessary owing to the impossibilty of identifying their character without one.

Lastly, most navies possess some vessels which have little or no fighting value, and, through lack of speed or other cause, are of little use for the attack and defence of commerce on the high seas. Attempts may be made with such vessels to raid harbours, with the object of doing as much damage as they can before being sunk or forced to surrender. The material results are not likely to be large, but the moral effect to be expected from even a small amount of success may often justify the enterprise, and, consequently, defensive arrangements against

[1] "Siege of Port Arthur from a Naval Aspect," JOURNAL of R.U.S.I., No. 335.

these "raiding vessels" are necessary, particularly where the harbour has two entrances, as that increases the raider's chance of escape in the end.

To sum up:—

1. The fixed sea defences of such harbours as are of use to a navy for fighting purposes are required to meet (i.) the attack in limited number of armoured ships of a class proportionate to the importance of the place; (ii.) the attack of torpedo craft, possibly assisted by boom-smashers; (iii.) attempts by fire-ships and raiding vessels; and (iv.), where the channels are favourable, those of blockers.

2. The fixed sea defences of purely commercial harbours are required (i.) to make it more profitable for unarmoured ships to pursue their business elsewhere; (ii.) to stop raiding vessels, and perhaps fire-ships; and (iii.) where the channels are favourable, to prevent the attempts of blockers.

CHAPTER III.

THE DEFENCE OF SEA FRONTS: THE ARMAMENT.

I.—*Against Armoured Ships.*

It is a common idea, held by some whose opinions are worthy of most respectful consideration, that land batteries require guns as powerful as those on the ships that may attack them. This is true if by "as powerful" is meant "with equal ranging power," for it would be no use to have batteries unable to reach the ships bombarding the objects defended, of which there was an instance in the last war between Chili and Peru; but, as will be shown, the idea is mistaken if other elements of power are implied.

Then, too, it has been calculated that a gun on shore, owing to the advantage of a stable platform, the facilities for ranging, and the clear definition of the target, is equal to three or four afloat. But if this could be proved it would not be of much service.

The fight between ships and forts is not a matter of gun against gun. It may have been in the old days when the batteries, owing to the limited gun range, were unable to support each other and were built near the shore, where ships, scarcely more vulnerable than themselves, could close and overpower them in succession. But now the batteries can support each other at long distances, and from construction and position are comparatively invulnerable, while a ship can be rendered useless for its primary duty by damage falling far short of complete disablement. The simple destruction of funnels will appreciably diminish a ship's speed, and may also interfere with her navigation and the working of her guns through the escape of smoke on the deck levels.

A navy that exposes its ships to damage in a side issue which will impair their power to fight other ships plays its adversary's game, and even if it gains a temporary success, its adversary will in the end profit. Consequently, such an enterprise as a really determined attack by ships on forts is one of those exceptional acts of war it would be extravagant to provide against, especially for a nation possessing a fleet that should make it impossible.

Old ideas die hard, and this, which expects admirals to close with forts, like Vernon at Porto Bello, Knowles at Port Louis, Exmouth at Algiers, and as in a modified degree Seymour did at Alexandria, may yet be found alive for some time, for few study the defence of harbours and many misapply history.

A misapplication, for instance, has been made in ascribing Rodjestvensky's fleet as the cause which deterred Togo from attacking the fortifications of Port Arthur. If there had not been a single Russian ship outside the harbour the Japanese would not have attacked, because damage to the sea forts would not have hastened the end of the siege, while damage to the attacking ships might have given the Russian a chance of escaping. The Americans did not attack the contemptible forts of Santiago.

Of course, armoured ships necessitate more powerful guns for the infliction on them of sufficient damage than do unarmoured, and battle-ships have a less portion vulnerable than do cruisers; but as long as a gun has sufficient power to inflict damage on a considerable portion of a ship before she can get within effective range of the object defended, a more powerful gun is not needed.

When the "ironclads" attacked Charleston on the 7th April, 1863, there were on the nine ships 32 guns, of which the smallest were as powerful as the largest in the six batteries and more so than all but two. The admiral reported next morning: "No ship had been exposed over forty minutes, and yet in this brief period . . . . . five of the ironclads were wholly or partially disabled, disabled, too, ... in their armament or power of inflicting injury by their guns. . . . . I was convinced that persistence in the attack would only result in the loss of the greater part of the ironclad fleet."[1]

Most battle-ships are now armed with guns of 12-inch calibre, but the British 9.2-inch gun of the latest patterns has practically equal ranging power, and its 380-lb. armour-piercing projectile has sufficient striking energy to injure the fighting efficiency of any ship afloat at a range of 6,000 yards. At a greater range it is quite safe to assert that no modern battery could be silenced without a greater expenditure of ammunition than any attacking squadron could afford unless it had complete command of the sea, for the only way to silence a gun is to hit it, and a gun is a small, and can be made an indistinct, target.

[1] "Naval Warfare," p. 421.

It will doubtless be urged that although ships cannot fight batteries with any hope of success, they may try to run past them in order to reach inner waters. Farragut in the Mississippi and at Pensacola showed how it could be done (when perhaps the relations of ships and forts were not very different to the present ones), and probably the passage of a channel or of narrow straits could now be forced without very great loss. Such an operation might be quite justifiable if undertaken as part of combined naval and military movements at a time when the enemy's naval force is quite insignificant, as was the case in the brilliant examples mentioned, but in the attack of harbours as an operation of naval warfare, this "running past" is, on the part of valuable fighting ships, almost inconceivable. It is obviously impossible unless the inner waters have sufficient area for the ships to turn and manœuvre in, which is very seldom; and the damage to dockyards, stores, etc., could not be great unless parties were landed, which a small infantry garrison could prevent. In 1776 ships forced their way into Charleston Harbour, but could do nothing when they got there. Moreover, at any naval port an assailant must reckon on the presence in it of torpedo craft, to whose attack his ships would be in the worst position to offer resistance.

The chief reason for demanding a gun of equal size to those carried by ships seems to be the idea that it is necessary to pierce the main armour to stop "running past," but it is extremely doubtful if any properly constructed and properly trimmed ship can be sunk by gun fire in the time she would be subjected to it. At Charleston in 1863, the *Keokuk*, not protected as much as a third-class cruiser is to-day, was holed nineteen times below the water-line, but kept afloat till next day.

If a heavier gun than the 9.2-inch is required, it would be wrong to use the present 12-inch, for the powers of resistance of the ships is sure to increase, and even now, if running past is eliminated, the 12-inch, as shown at the battle of the Sea of Japan, has not sufficient penetration to reach vital parts at the probable ranges. And of course the limit of the size and weight of guns mounted on land is mostly a matter of expense.[1]

If a single instance of a determined attack by ships on fortifications, or of an attempt to run past batteries, made while a state of maritime warfare existed by a navy not in a position of decided superiority could be cited from history, it might be an argument in favour of having fixed defences for inner waters, and perhaps for an extended scale of defence generally, but it would be no justification for the use of heavier guns under present conditions.

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[1] The case for the 9.2-inch is stated in some notes in Vol. XXXII., No. 6 of the Journal of the Royal Artillery, and the necessity of having 12-inch is argued very fully in a paper on coast defence in Vol. XXII. of the Journal of the United States Artillery.

The smaller gun has a longer "life," its mounting and ammunition are cheaper, a less number of men are required to work it, and the whole upkeep is less expensive.

These advantages might to a great extent disappear if the use of the lighter gun entailed having a greater number, though the margin of economy is large, but this is not the case, because the work to be done is not silencing the ships' guns but only injuring the ships' fighting efficiency.

In the most unfavourable circumstances the number need not be large, because a single ship or two form a big part of any squadron and damage to such a part seriously affects the fighting efficiency of the whole, and, therefore, if the fortifications can injure so much of the assailants' strength, they may be considered equal to their task. This is certainly so when the harbour belongs to the superior naval Power; and where the inferior is the owner it will always be debatable whether the funds spent on increasing the scale of the armament beyond the limit suggested cannot be better applied.

There are no *data* available on which to found a sure estimate as to the number of guns that can with certainty be counted on to injure the fighting efficiency of one ship. Consequently, the following opinion is without authority. Two guns should be enough, if the conditions are favourable, which they may be considered to be when good sites are available, the ships have to approach the batteries within a range of 6,000 yards in order to bombard the objective, and the gunners are thoroughly trained. It is, however, always better to allow three guns, because modern gun-mountings cannot be made more certain in action than any other machines subject to great and sudden strains. This means that, to ensure injury to one ship, and so prevent bombardment of the defended object, every part of the water area in which the ship can act must be under the fire of two or three guns.

The local conditions clearly affect the total number, and it rests with the naval authorities to say how many ships the fortifications should be capable of dealing with simultaneously.

So far, heavy guns mounted for direct fire have alone been considered, and the employment in the combat with armoured ships of high angle fire (H.A.) guns and medium guns has now to be discussed. Are the former, with their power of attacking ships' decks, necessary or desirable weapons; and have the latter, with their rapid rate of fire, any useful place?

The affirmative reasons for the employment of H.A. guns are:—

1. A ship is peculiarly vulnerable to the attack of projectiles falling on her deck, as she is built to resist direct fire on her sides.

2. The accuracy of high angle fire is sufficient to prevent ships anchoring in its area, and unless they anchor bombardment cannot be really effective.

3. A gun of the same calibre as those proposed for direct fire can be used, while it may be of an earlier pattern with less muzzle velocity.

4. The striking energy is not lessened by an increase of range, as the velocity on arrival is practically that due to gravity.

5. The guns can be put in positions where they cannot be touched by the fire of the ships.

6. At some places there may be areas of water, whence the objective can be bombarded, which cannot be brought under direct fire without the employment of special works, involving extraordinary expenditure, or an undue extension of the perimeter of the fortifications. Such exceptional conditions may make H.A. guns desirable.

7. As they can be given an all-round arc of fire, which the ground generally prevents in the case of direct fire guns, they can, with their ranging power, participate in the defence of both the sea and land fronts. This is deserving of careful consideration where an assailant may be able to employ heavy H.A. guns on land.

The negative reasons are:—

1. So far as actual experience goes, the results of hits is not more efficacious than that to be expected from direct fire.

No better opportunity of getting the utmost effect with H.A. guns can be expected than the Japanese had with their 11-inch howitzers at Port Arthur, after the capture of 203-Metre Hill; yet, according to the notes of a naval architect in "Engineering," the hits on the decks of the anchored Russian ships were approximately as follows:—On the *Peresviet* 12, of which only 4 penetrated the 2-inch armoured deck. On the *Bayan* 3, of which all penetrated the protective deck, equivalent to 1⅝ inches of armour, and one smashed an engine cylinder. On the *Poltava* 3 holes visible in the upper deck. On the *Retvisan*, no holes. On the *Pobieda*, 3 or 4 holes in the deck. On the *Pallada*, 7 holes in the upper deck. At the time of the examination the ships were still partially submerged; but divers had discovered no holes made from the inside, and the projectiles appear to have had no part in sinking the ships.

The remarks of "Engineering" are:—"The 28-centimetre shells, which did most damage, were fired from 203-Metre Hill, at a distance of some four miles. The angle at which they fell on the ships—some 30 degrees with the vertical—made the conditions for accurate shooting by no means favourable. Although the number of wasted shots is unknown, it is noteworthy that those that took effect were numerous. As to the damage done, it will be seen by a study of the details that the explosive effect of the shells was less noticeable than might have been expected . . . In the case of some of the shells which struck the *Peresviet*, their force was evidently spent on reaching the protective deck, and they failed to penetrate it; some small damage was done to the deck by them to the extent of very

obvious bulging of the deck downwards, where they struck and exploded; but a general destruction of surrounding portions of structure did not appear. As will be seen, four or five shells penetrated the protective deck, but even these became spent without serious tearing up of the parts below."

The results have been given rather differently in the "Journal of the U.S. Artillery,"[1] but in this account, too, none of the hits are said to have inflicted vital injury. Perhaps too much weight should not be given to this failure, as it is stated that the projectiles were uncapped cast iron shells, weighing 448 lbs., with a charge of 20 lbs. of powder. Great accuracy and sufficient penetrating power are claimed for an American 12-inch mortar, firing a specially designed shell of 800 lbs. With slow velocities, however, accuracy cannot always be counted on under service conditions, and the chances of the shells bursting before they reach the protective deck must be very great.

2. Ships can be deterred from anchoring just as well by direct fire guns, and it is of very great importance to limit the natures of the guns and mountings employed as far as possible, because it reduces arsenal charges, simplifies supply, facilitates the training of the troops, and conduces to economy generally.

3. The extra cost of the mountings outbalances the saving due to the utilisation of old pattern guns.

4. The accuracy against a moving target is always inferior to that of direct fire, and the rate of fire is less.

5. The officers and men require more training, and, in some respects, a different one, which cannot be lost sight of in the case of those fortresses whose garrisons have to find drafts for foreign service.

6. H.A. guns can never suffice by themselves—their most enthusiastic advocates have not attempted to maintain that—and they can only be auxiliary to the others. If the minimum number of direct fire guns necessary to cover the water area and to provide for ordinary casualties will suffice for the defence of a harbour, as in most instances it undoubtedly will, then H.A. guns are surplus to the requirements, and as such inadmissible luxuries.

Some of the above reasons are certainly debatable, and the lists, both *pro* and *con*, can probably be extended; but the last one bars the employment of H.A. guns, unless the local conditions are extraordinary, and even in such cases the second negative reason is strong enough to make necessity the only justification.

Neither are medium guns weapons for the combat with armoured ships.

It is true that "Garrison Artillery Training" includes amongst the forms of attack to be expected one made for the purpose of reconnaissance, which "may be undertaken in order to acquire information as to the situation of the defences or as

[1] Vol. 26, No. 2, September, 1906.

to the presence of battle-ships or cruisers in the harbour." In many cases the latter purpose could not be attained without an approach to within a range at which considerable effect from medium guns might be expected. But it is difficult to imagine ships being subjected in the possible immediate neighbourhood of their enemy to the injury from the heavy armament such an approach would involve; nor is it easy to suppose an assailant, ignorant of the situation of the defences, which must be of a permanent nature. There are other methods of gaining information, and there seems no probability of the need for it being so pressing as to cause ships of fighting value to place themselves within reach of heavy guns at ranges which are sufficiently short for the medium.

Why, then, are medium guns, such as the 6-inch, to be found in many places mounted near the heavy ones and firing over the same areas? They were placed there when ships had a considerable medium armament very weakly protected, and were expected, not only by soldiers and laymen but also by not a few sailors, to close to ranges at which this medium armament would stand a good chance of silencing the slower firing heavy guns of the batteries. It has been shown that these tactics cannot now be right, and it may be added that if ships have the time and ammunition at their disposal for silencing batteries, the conditions will make an attack by landed troops possible, and therefore render it unnecessary to push home the ship attack. It must be remembered that a purely naval attack on a harbour of sufficient importance to have a heavy gun defence at all can have no really effective result.

To sum up: The conclusion arrived at is that for the combat with armoured ships the guns of fortifications, while they must have equal ranging power to those on the ships, need not have a larger calibre than is necessary to ensure injury to the ships' fighting efficiency, and that their number does not depend on that which the ships may be able to deploy against them, but on the amount of deterrent effect required in the region where the harbour is situated, which depends on the strategical plans of the navy it belongs to.

If views contrary to the above are adopted, namely that ships will close with batteries and that the fight will be between gun and gun, an enormous number of guns may be demanded, as is shown by the following extract from a paper on Coast Defence, by Major John P. Wisser, Inspector-General, in the Journal of the U.S. Artillery: "The number of rapid-fire guns required by a coast fort is determined by the number which an attacking fleet can deploy against it, and should be at least half that number. For every mile of the line of battle in which an enemy can deploy, within two miles of a fortified place, about 150 rapid-fire guns will therefore be required."[1] If this is right, the defence of harbours by fortification is wrong.

The means of defence other than the guns, such as dirigible torpedoes, submarine mines, and electric lights, cannot be ap-

[1] Vol. XXII., p. 269.

plied against armoured ships unless they place themselves within their limited range, which is unlikely, and therefore consideration of them will be deferred. Electric lights are necessary to prevent the passage of straits as adjuncts to the guns, whose action in the same case may be usefully supplemented by that of mines and torpedoes; but our subject is the defence of harbours, and for that the only weapon which need be given to fortifications under present conditions is the heavy gun.

II.—*Against Torpedo Craft.*

Armoured ships, as befits their dignity, have been given pride of place, but a raid by torpedo craft is a far more likely form of attack on a harbour used as a naval base, especially if ships, fighting or auxiliary, forming part of the naval means of war, are lying in it.

As the attack will probably be made at great speed by several boats at once, and under conditions of light and weather unfavourable to the shooting of the guns, the latter should be able to get off as many shots as possible; and, therefore, as the smaller the calibre the quicker generally the loading and firing, the best gun is the smallest that has sufficient power to disable a boat.

Until lately our 12-pounder Q.F. gun of 12 cwt. has been considered to fulfil the conditions, but the size of the boats is increasing, and in some instances slight protection has been given to vital parts, while the simple disablement of the engines or a hole of small dimensions in the hull cannot be expected to stop a boat quickly when moving at high speed. It is necessary that there shall be no mistake about the disablement, as a crippled boat may do much damage, and the sooner it is apparent the sooner the gun can be turned on to another target. Therefore, although the greater portion of the anti-torpedo-boat armament may for a time consist of 12-pounders, some of the guns should be larger.

The size will be limited by the celerity of training necessary for the sights to be kept on the target, which is attained with the mountings of the 4-, 4.7-, and 6-inch guns in the British Service; and from the following table[1] it will be seen that these medium guns have advantages over the light quick-firers in everything except the rate of fire:—

Guns sited 50 feet above sea level. Target, 4 feet freeboard, 9 feet beam.

Range ... yds.	500			1000			1500		
Gun	12-pr.	4·7-in.	6-in.	12-pr.	4·7-in.	6-in.	12-pr.	4·7-in.	6-in.
Slope of arrival 1 in.	24·3	25·2	26·1	29·8	32·3	37·2	25	30·4	37·2
Permissible error along water ... ... yds.	51·6	53·4	55·2	62·7	67·8	77·4	53·1	63·75	77·4
Hits per cent.	100	100	100	100	100	100	92·6	97	99
Hits per minute ...	15	10	6	15	10	6	13·9	9·7	5·94

[1] For which I am indebted to Captain D. Clapham, R.A.—R.F.J.

There are instances of lighter guns than 12-pounders being mounted by some countries, but it is generally agreed that their power is not sufficient; and though the rapidity of fire attainable with 12-pounders is recognised as being very desirable, there is a distinct tendency to the use of heavier natures, which has increased in consequence of the small effect on the Japanese destroyers at Port Arthur achieved by the Russians with the fire of land batteries or with that of similar boats. It is quite certain, whatever may have been the results of past peace experiments, that the present ocean-going destroyer can stand a lot of punishment from light guns.

Attempts have also been made to utilise heavy guns—obsolete for other purposes,—which happen to be mounted where they command channels at short ranges, by giving them special case-shot and arranging to fire them as boats pass certain points. Experiments have, however, shown that the value of their effect is not sufficient to justify the expense of their upkeep.

The number of guns required depends so entirely on local and tactical conditions that in order to avoid repetition a detailed examination of the question is better deferred till artillery tactics are dealt with in the next chapter. All that need be said here is that the number reasonably desirable will always be considerable, but the employment of medium guns in the anti-torpedo-boat armament will lessen the total, because although the rate of their fire is slower, they will, owing to the requisite hits for disablement being fewer and the effect being more quickly and easily observed, be able to change their target sooner. As, too, the medium guns will generally be able to carry out some of their own particular duties in the same positions, there will be economy in men and also in gun sites, which latter is often a very important consideration.

There is always a chance of misty weather enabling a boat or two to slip past the guns, and consequently a boom across the entrance, strong enough to withstand the charge of torpedo craft and defended to prevent its destruction by other means, is desirable where possible, and necessary where complete immunity from attack is wanted for the ships in harbour.

But no boom can be made strong enough to resist the charge of a ship of even moderate size. Therefore it must be expected that where there is a boom a "boom-smasher" will be employed. The ship must be sunk or diverted from her course at some distance from the boom, because she may effect her purpose even while sinking with little way on her. The light Q.F. guns have not sufficient power to do this. Indeed, where the ship can get near before coming under fire, as when the boom is near the open sea, it is doubtful whether medium guns will suffice, and if heavy guns happen to be in suitable positions they should certainly be provided with electric lights so that they may assist the defence. As, however, most booms can be placed some way back, where the approach will be hindered by difficulties of navigation and the dazzling effect of electric

lights, a medium gun, like our latest 6-inch, may be accepted as the best weapon on account of its rate of fire compared to that of any heavier piece.

Although the number of boom-smashers is not likely to exceed one or two, still, some liberality should, when the available sites admit, be exercised in fixing the number of guns, because in addition to assisting the lighter guns they will generally be also able to act against blockers and raiding vessels.

Electric lights form an essential part of the anti-torpedo-boat armament, as without them the guns are useless at night. They are used with their beams concentrated to extend their range as much as possible, or with them dispersed for the creation of an illuminated area. The concentrated lights are referred to as "search-lights," when used for reconnoitring; as "sentry-lights," when forming a fixed beam of light across the channel of approach; and as "fighting-lights," when employed to follow a target while guns are firing at it. The area lit by a set of dispersed lights is called an "illuminated area." When the channel is sufficiently narrow there is no reason why a dispersed light should not be used as a fighting light, if it ensures the guns it serves having the target illuminated for a sufficient time, but a fighting light can only be calculated to illuminate one target at a time.

As torpedo craft will probably attack, or more correctly speaking attempt to run past, the batteries in some numbers at a time, there would be much danger of confusion if fighting lights were used, and consequently the anti-torpedo-boat guns should always be assisted by the creation of an illuminated area. The depth from front to rear of this area will be dealt with when artillery tactics are considered.

In order that the gun detachments shall be able to obtain rest and to insure the boats being fired at as soon as they enter the illuminated area, there should always be a sentry-light placed as far in advance as possible, and search-lights outside that.

One of the first acts of Admiral Makaroff after his arrival at Port Arthur was to narrow the fairway by sinking two stone-laden steamers, and as it is obvious that the difficulties of the boats and the chances of the guns are increased if the channels of approach are restricted, all forms of obstruction, such as breakwaters, piles, etc., are of assistance to the defence, and may be counted as part of the fortification. As, however, they must affect the navigation, their application is best left in naval hands, which remark should also have been made with reference to booms.

The armament, then, required to meet torpedo craft raids is a liberal number of light Q.F. guns reinforced by some medium ones, combined with a complete equipment of electric lights, and assisted by such obstructions as the locality may admit.

Probably at not a few harbours a complete defence is impossible owing to either local tactical conditions or to the ex-

pense. In such cases it is entirely for the naval authorities to decide whether a partial one is of any use, and if the Army has to man the defences it has only to see that their limitations are understood, and to make the best of the material placed at its disposal.

III.—*Against Unarmoured Cruisers and Other Vessels.*

With regard to the bombardment of commercial harbours, it has already been pointed out that the only attack to be apprehended is one of small dimensions made by unarmoured cruisers. Such ships can be penetrated anywhere above their protective decks by any artillery projectile, and a very small gun defence is calculated to cause them to direct their energies elsewhere. It is, however, not desirable to employ guns of less calibre than 6 inches, because they must not be out-ranged by those on the ships, and a smaller shell would not have sufficient destructive effect after penetration.

It must be noted that there are places where heavier guns are wanted. At some political considerations make it desirable to prevent the effect of even long-range bombardment, at others local conditions are the cause; either the absence of sites for the guns in advance of the object defended or the peculiar clearness of the atmosphere, both of which create a demand for greater ranging power than is possessed by medium guns. Heavier guns, too, may be wanted in the future, if such armoured cruisers as have ceased to fulfil the necessary qualifications to lie in line of battle are used against commerce. Fortification is not an exact science, and there can be no finality. In the case of any important commercial harbour being now fortified for the first time it would probably be true economy to mount heavy guns.

Where all the necessary area of water can be covered by them two guns are sufficient, though three are desirable to allow for casualties, but four are often wanted, and the absence of favourable sites may sometimes make a greater number advisable.

To stop boom-smashers, blockers, and raiding vessels of all kinds, their rate of fire gives medium guns an advantage over the heavy, though the latter, if favourably placed, should be utilised also for this purpose.

The guns should be sited so as to have the best chance of stopping ships, if possible, well outside the harbour entrance or the point they aim to reach; but as all such enterprises must be undertaken at night, the effective range of the fighting lights attached to the service of the guns will generally be the determining influence in the matter. As a rule one set of guns will suffice to provide against all the forms of attack. Against boom-smashers and raiding vessels two guns may suffice, though for mechanical reasons three are desirable, because one is decidedly not enough, but in the case of blockers, the number

of vessels that may act simultaneously must be taken into account, and even ten or twelve guns may not be too many.

One of the safeguards against fire-ships and raiding vessels consists in forbidding any ship entering the harbour until she has been examined. As it is necessary for the ship to anchor in smooth water for examination, local circumstances may necessitate a special siting of some of the guns near the inner boundary of the appointed anchorage.

There now remains for consideration the use of dirigible torpedoes and submarine mines as means of stopping raiding vessels, blockers, or boom-smashers.

Dirigible torpedoes, such as are at present available, have three defects: their range is small, their rate of fire slow, and the number of shots from each installation very limited. If a channel is covered by their range they are certainly unpleasant things to have to pass, but ships should not be sunk in the fair way, and at night there is some difficulty in securing accurate direction. As their action will in all probably be confined in future to the classes of ships named, because others will not venture within their range, it seems that the cost of their installation and upkeep can be better applied.

Submarine mines are of two descriptions: the automatic and the controlled; the former acting on any shock of contact, the latter either on contact, when their mechanism has been made active by electrical means, or when exploded by an electric tube.

The automatic have proved as dangerous to friend as to foe, and it was said after the American Civil War that more lives were lost by accidents during their removal than from their action during the war. The casualties caused by them at Port Arthur show that they may effectively assist in the blockade of a port, and on the other hand greatly increase the risks of making the blockade a close one; but it is clear that they cannot be used defensively by a combatant who wishes to keep his harbours open to traffic, which must always be the case with a maritime nation.

The controlled mine is without doubt on quite a different footing; but the secrecy observed as to their working and the results of peace tests, and the absence of any thorough trial in actual war, have given rise to considerable suspicion of their reliability and efficiency, especially when they have to be placed too deep to be fired in contact with a ship's side or bottom. We will, however, suppose that they are perfectly safe as regards friendly ships and perfectly sure to act with effect against those of an enemy.

There seems to be fairly well defined limits to the depth of water, the rate of current, and the size of area they can be laid in, and they can be disabled by various forms of attack which they themselves cannot ward off. These characteristics confine their use to somewhat retired positions, and necessitate a special

provision of guns and electric lights for their protection, unless the Navy undertake all responsibility for them.

They are decidedly an economical means of defending a channel, though the special guns and lights rather lessen the economy, but the damage to be expected from raiding vessels is not large, and it is desirable to stop blockers and boom-smashers well outside the entrance, and not to sink them in the channels.

If ever fighting ships were to attempt to enter a defended harbour they would undoubtedly take precautions to render a mine field innocuous, and they will now be able to do this in spite of an efficient gun defence, if there is good foundation for the report of a board of officers on a trial of the submarine boat *Protector*, of which the following is an extract:—"It can run past any mine-field, as at present installed, with but little or no danger from the explosion of any particular mine or from gun fire during the few seconds it exposes the sighting-hood for observation, and can attack at its pleasure vessels in the harbour. The board personally witnessed the ease with which cables can be grappled, raised, and cut while the boat is manœuvring on the bottom. Mine cables can be swept for, found, and cut, or a diver can be sent down for that purpose."[1]

Again, mines take some time to lay down and some time to replace when in any way injured, and although we assume that there is no danger of friendly ships being sunk by mistake, there is reason to suspect that the ships may be incommoded by them and that they may be injured by the ships.

It cannot be denied that they must be credited with exercising considerable moral influence, but this to a great extent is obtained by the simple possibility of their presence, while it is diminished by even a slight knowledge of their whereabouts, such as is almost certain to become accessible when they are operated from fixed positions on shore, and are provided with a special defence of guns and electric lights.

For these reasons it seems desirable to maintain some of the material, but to leave its application to the Navy, which can use more latitude in the location of the fields, and has no need to make preparations that may disclose it. This is a departure from the policy of relieving the Navy of everything connected with the security of its harbours that the Army can perform, but the occasions for the employment of mines for defence by a strong naval Power promise to be few, and the economy possible in consequence of making the material movable is large, while it must always rest entirely with naval authorities to decide whether mines shall be used or not.

The conclusion arrived at is this: that to meet the action of unarmoured cruisers and other vessels the armament can under present conditions be best composed of medium guns with a calibre of not less than 6 inches, assisted, except in the case

[1] Journal of the U.S. Artillery, Vol. VIII., p. 248.

of those mounted solely to prevent bombardment of commercial harbours, by electric lights.

Broadly speaking, harbours that are of importance to a Navy for fighting purposes require heavy guns to ward off armoured ships, light Q.F. with some medium guns to meet torpedo craft, and medium guns to stop all other vessels; while commercial harbours want medium guns alone; the action of the heavy guns will be chiefly by day, and that of the others almost entirely by night, and therefore dependent on the assistance of electric lights.

(To be continued.)

RECENT MANŒUVRES CARRIED OUT BY FRENCH TORPEDO FLOTILLAS.

THE following account of some exercises carried out by the French Northern Torpedo Flotillas has been contributed to *La Vie Maritime* by M. Charles Bos, the Editor of that valuable little Service periodical. M. Bos was until recently one of the Deputies for Paris; he has twice served as the Reporter to the Chamber of the Naval Budget, is recognised in France as an authority on naval matters, and on the present occasion was the guest of Vice-Admiral de Jonquières on board the *Indomptable*.

"By order of Vice-Admiral de Jonquières, Permanent Inspector-General of Flotillas, all the torpedo-boats, together with the Channel and Atlantic divisional destroyers, were concentrated at Brest about the 10th of last June. In order to allow these small vessels to carry out sham attacks and make use of torpedoes with shock heads, the coast-defence-ship *Indomptable* was commissioned by Capitaine de Frégate Didelot at Cherbourg, and as soon as ready for sea she proceeded to Brest, where she arrived about the same date as the flotillas. Before the arrival of Vice-Admiral de Jonquières, the united flotillas carried out various exercises, and practised firing their torpedoes, under the orders of Vice-Admiral Boué de Lapeyrère, Maritime Prefect of Brest. Owing to the *Indomptable* developing some defect it was not until the 22nd of June that the Inspector-General hoisted his flag on board her, and that the programme of manœuvres and attacks, drawn up by him with the assistance of the General Staff, could be commenced.

In addition to the flag-ship, there were lying in Brest Roadstead 45 destroyers and torpedo-boats, under the orders of the Commandants of the five flotillas of the Channel and Atlantic:—

Brest Flotilla: Commandant, Capitaine de Frégate Tonnelier.
Dunkirk Flotilla: Commandant, Capitaine de Frégate Pumperniel.
Cherbourg Flotilla: Commandant, Capitaine de Frégate Mercier de Lostende.
Lorient Flotilla: Commandant, Capitaine de Frégate Delguey de Malavas.
Rochefort Flotilla: Commandant, Capitaine de Frégate Louël.

Before giving an account of the manœuvres and night attacks, which were most interesting, we must make some observations of a general nature.

The *Indomptable* was commissioned, as we have said, at Cherbourg. The shortness of men made itself very evident, since contingents from the crews of all the ships in reserve had to be drawn upon to man her, and as the men had on their cap ribands the name of the ship to which they properly belonged, the *Indomptable* had the appearance of having picked up the survivors of a naval disaster. If a foreigner had seen this fortuitous crew, he would not have failed to say that our naval decadence was irremediable. When is the solution of this great question of the effectives going to be taken in hand? It is not possible that the present state of things can continue. Not only is there a deficiency of seamen when it is necessary to commission a ship in the reserve, but ships supposed to be fully manned are some ten to fifteen per cent. short of their proper complements.

It is quite clear that our flotillas are well trained and in a condition to work together when massed. We have never before attempted so large a concentration as that which Vice-Admiral de Jonquières has carried out, and we congratulate him heartily on his happy idea, and on his having realised it. As we have so often pointed out, the dispersion of our torpedo-boats between the principal coast ports is a huge blunder. It is a mere electoral move, and from no naval point of view can it be defended. To imagine that our great commercial ports will be defended against hostile aggression, and that our coast will not be ravaged because a number of small torpedo-boats are dotted about all over the place, would be equivalent to saying that our eastern frontier would be inviolable if, instead of being concentrated in forts or prepared positions, our soldiers were ranged side by side along the whole length of the frontier.

So let us hope that the concentration effected by Vice-Admiral de Jonquières will show the General Staff the necessity of starting afresh in a definite fashion. The Rochefort, Lorient, Brest, and Cherbourg Flotillas, as well as the presence of some torpedo-boats at St. Malo and Havre, have no *raison d'être* in present circumstances. It is in the vicinity of the Straits of Calais that all these small units should be concentrated: at Dunkirk, Calais, and Boulogne. There, even in broad daylight, except in thick weather, an attack *en masse* should be successful against an enemy's fleet—one may divine whose—which wished to force a passage. Let us say, *àpropos* of this, that by action *en masse* we do not wish to say that all the destroyers and torpedo-boats should act at the same time, but concentrated, as we have indicated, they would attack by *échelons* in such a way as to harass the enemy and inflict upon him serious losses, while affording each other mutual support.

Next, it is evident from these manœuvres that some unification of the tactics to be employed by torpedo-boats is called for. At the present time each flotilla commandant has his own system which he believes—and it is only human nature—to be the best. In each of these tactical methods there is clearly something

good to be extracted. But everybody's views have hitherto failed. It is necessary to unify and have only one system, and the concentration of the torpedo forces will singularly facilitate the drawing of one up.

* * * *

The programme of the manœuvres and the attacks was admirably conceived. Vice-Admiral de Jonquières always kept in view the hypothesis of war, and for several days the amalgamated flotillas carried out as far as possible what they might actually have had to do in war. It was a pleasure, moreover, to note the simplicity and clearness of the admiral's orders. After a few minutes' conversation with their chief, the commandants of the flotillas had learned what he wished, and understood his intentions; while the written orders which were afterwards transmitted to the different commandants and by them to their subordinates made their execution quite easy. To those who, never having served under his orders, only knew Vice-Admiral de Jonquières by reputation, he revealed himself as a true leader, clear-sighted and skilful, daring and prudent. An excellent handler of ships and a fine tactician, a fascinating personality, thoroughly acquainted with his work and kindly to all.

The flotillas weighed at 6.30 p.m. on Monday, the 22nd of June, to proceed to the position in the sector to which each had been allotted, which would be crossed by an enemy at a certain hour of the night. The *Indomptable*, representing this enemy, quitted the shelter of the roadstead some two hours later. The first attack was to take place after sunset, about 9.45 p.m. Naturally the *Indomptable* was steaming without lights. The sea was smooth and the night without any moon, but perfectly clear.

The Rochefort Flotilla was the first to carry out, off Toulinquet, an excellent attack, both on the port and starboard side. The divisional boat, followed by three units, passed to starboard, whilst the others, coming up at intervals of a minute, made as if they wished to pass to port of the ship. The first torpedo-boats were sighted when about a thousand yards off. A shot from one of the starboard guns announced to the flotilla that they were discovered, and the search-lights were turned on each of the vessels. These steamed past at a distance of scarcely four hundred yards, firing one after the other a shot from one of their guns to indicate that they had fired their torpedoes, and afterwards turning on their position lights. At the moment that the divisionaire signalled firing her torpedo, the first vessels of the rest of the flotilla were sighted on the port side at a distance of seven or eight hundred yards. A shot from the port gun announced that they were seen; the search-lights were turned on, and torpedoes nominally discharged. Had it been real war, it is probable the *Indomptable* would have been struck.

Further on, and when steering for the Chaussée de Sein Light, the Brest Flotilla, which was more numerous, took up the attack, which was excellently carried out, and would have achieved, like the others, some results in war. Some miles from the light of the Raz de Sein the *Indomptable* altered her course and steered towards Ushant Light. Immediately afterwards the Lorient Flotilla made a successful attack. Further out at sea came the turn of the Cherbourg Flotilla. Finally the *Indomptable*, having altered course in order to gain her anchorage in the Cove of Morgat, in Douarnenez Bay, the Dunkirk Flotilla attacked her when off Cape de la Chèvre.

The manœuvres of the night were finished. It was almost 1 a.m. The *Indomptable*, with all her fires alight, made straight for the Cove of Morgat, escorted and followed by the forty-five small vessels, all showing their lights, which gave to the anchorage, which was reached at 2.30 a.m., the appearance of a pretty Venetian fête.

* * * *

The next day, in broad daylight, new manœuvres, representing other night attacks, were carried out. For these manœuvres the *Indomptable* and five destroyers in line ahead and flanked to port at a distance of about 400 metres (437 yards) by four torpedo-boats representing destroyers, were supposed to represent a battle squadron. The 36 units which remained were divided into three flotillas.

According to the prearranged scheme, the *Indomptable* was visible to the flotillas at a distance of 5,000 metres (3 miles 188 yards), but they, on their side, were not considered in sight until within 1,200 metres (1,312 yards).

The attacks were well carried out. The *Indomptable* first stood towards Ushant. The first flotilla attacked her on both sides simultaneously. The three last ships in the line would have been in danger.

The *Indomptable*, after passing some miles off Ushant, altered course and steered for the Chaussée de Sein. The second attack was made in three divisions: the one on the right was composed of the fastest vessels, that on the left of the slowest, the centre division being made up of the remaining units. The left and centre divisions manœuvred so as to pass to port, whilst the other went to starboard. The admiral, in order to deceive the enemy, altered his course to port.

The *Indomptable* then presented her bow to the left division. At this moment the units of this division formed line abreast in order to pass to port, during which the *Couleureine*, the leader of the centre division, had to go astern to avoid colliding with one of the torpedo-boats of the left division. Meanwhile, the right division, coming up at full speed on the starboard side of the enemy's line, attacked the other five ships. Had the attack been a real one, the squadron would have been badly damaged.

The third attack was made about 6 p.m. at the moment when the *Indomptable* and the squadron, having altered course, were steering towards the Bay of Douarnenez. In two divisions this time, the attack was made from both sides simultaneously.

The squadron and the flotillas anchored together just in front of Morgat. After dinner other night attacks were made.

The flotillas weighed again at 8.30 p.m., in order to station themselves along the route which the *Indomptable* and the five destroyers, representing the enemy's battle squadron, would have to follow. The sea was quite calm, but with some fog in the Iroise Channel. The squadron quitted their anchorage a little later. The weather was very clear, so that the flashes from the numerous lighthouses along the coast showed up with extreme brilliancy, leading one to suppose that a thick fog would come on suddenly. There were five attacks, each flotilla acting independently.

The *Indomptable* and the squadron retraced the route they had previously followed, but in the opposite direction. All the attacks were well carried out. However, when the last one was being made by the Dunkirk Flotilla, towards one in the morning, and a little before the entrance of the Goulet was made, the night had come on so thick that nothing could be seen. Already one of the other flotillas had passed very close to the squadron without sighting it, although it had been seen itself. The Dunkirk Flotilla, coming down on the starboard bow, was only sighted when a few hundred yards off, standing across the *Indomptable's* bows just ahead. A catastrophe being possible, the *Indomptable* showed her lights, and she was only just in time. The *Durandal* crossed her bows at full speed at a distance of barely 60 metres (65 yards) from her ram; the torpedo-boat which followed, ported her helm, the *Indomptable* did the same, so that the former was able to pass to port of the flag-ship. The third boat followed suit, but passed further to seaward. The other vessels, in line ahead, attacked the squadron to starboard.

The end of the exercises was then signalled, as well as permission to the flotillas to return to Brest. The *Indomptable* reached the entrance of the Roads at 2 a.m. Then the fog suddenly came down, and after having passed the Mingant Rock, the Minion Light could scarcely be seen. The ship anchored in Boscanvel Cove at 2.30 a.m., and did not reach her buoy in the harbour until 7.30 a.m. of the 24th. Several flotillas entered the harbour, but the Rochefort one, which had the furthest to go, passed the night in Bertheaume Cove.

* * * *

Such were the manœuvres, and they are worthy of notice for more than one reason. They were well conceived and well carried out. They have constituted an excellent preparation for battle, and there has been no mishap to deplore, thanks, as we feel bound to say, to the skill and training of the commandants

of the destroyers and torpedo-boats, as also to the caution of Vice-Admiral de Jonquières and the *sang-froid* of Commandant Didelot. A simple accident—a rush of water into a condenser—compelled one of the Brest torpedo-boats to quit the scene of operations in tow of one of the tugs.

Everything passed off admirably. The night attacks, however, call for a few reflections.

In the first place it seems clear that the true moment for attack by a torpedo-boat is at the end of the twilight or at the commencement of the dawn, when there is no moon. At such times the night, in the latitude of Brest, is very dark. One can see nothing.

Next, we are forced to the opinion that the best method of attack is that which consists of acting against the port and starboard side of a ship or fleet in line ahead, but not simultaneously, an interval of a minute and a half or two minutes being left between the two attacks, so as to take advantage of the very short time during which the attention of the enemy is entirely occupied on the side where he has sighted the torpedo-boats. It is the second part of the attack which has some chances of success on the unwatched side. Consequently, it is necessary that each group of torpedo-boats should consist of at least five units, or at most six, because it is necessary to make allowance for possible, even probable, loss. With a larger group, the risk would be run of the others being sighted, brought under the search-lights, and sunk before being in a position to act.

In the third place, it is indispensable that to the first attack should succeed several others in order to keep the enemy continually on the *qui vive* and harassed until he has sustained serious losses. Concentration should therefore take place in the latitudes where the enemy may logically be expected to operate. The concentration being made—and it ought to be carried out during peace—each group will attack one after the other, it being understood that the attacks follow each other rapidly.

In addition, a torpedo-boat, in order to arrive at a convenient distance for discharging her torpedo without being seen, should make no noise nor betray its presence by any smoke. From this point of view our training torpedo-boats can be used for a long time to come, because great speed is unnecessary. At night, without lights, an enemy's squadron, having to fear a torpedo attack, will navigate at slow speed. Our torpedo-boats, even those steaming only fourteen knots, will be able to take part in an attack on a squadron under those conditions, because at this speed there is neither noise nor smoke, when the stoking is carefully regulated.

Finally, we must remark that manœuvres of the kind of which we have been speaking and which constitute the real preparation of the torpedo-boats for war, should be frequently carried out. The visits of the Permanent Inspector-General of the Flotillas, however, are very rare, as he has other duties to perform.

It follows from this that the Inspector-General should be a Commander-in-Chief, having the same advantages and the same privileges as the Chief of a Squadron. The concentration of his forces being made, partly in the Mediterranean, partly in the Channel, two ships should be placed at his disposal for the exercises of the various flotillas. The flotillas in the Channel and Mediterranean should be each commanded by a Captain, who would explain the ideas and tactics of the Commander-in-Chief. The latter, periodically hoisting his flag on the ship of the Commandant of the Flotilla — the *Chateaurenault* and *Guichen* would suit admirably—would exercise the torpedo-boats and judge of their state of training.

Common-sense, as well as strategy, call for these measures being taken with as little delay as possible. Submarines and torpedo vessels would then have the necessary plan of operations, and would be able to render us the service we expect from them.

LORD NELSON'S SIGNAL.

By B. E. SARGEAUNT.

RECENT investigations, assisted by a controversy in *The Times*, have proved that the historic signal made by Lord Nelson on the 21st October, 1805, has been wrongly represented, as regards the flags, for many years, and the discovery of the mistake is due to Mr. W. G. Perrin, the Admiralty Librarian. For how long the signal has been incorrectly displayed is difficult to ascertain, but it is certain that since the year 1885 the wrong flags have been almost universally exhibited.

The Admiralty Signal Book as used at the Battle of Trafalgar was printed in the year 1799, but in November, 1803, owing to the capture of certain vessels by the enemy, the Admiralty changed the numeral flags in the book and issued slips of flags for pasting over the original ones as painted in the book. After this date the new books were issued with the flags changed and painted on the page of the book itself.

In the year 1803, the Vocabulary Signals, invented by Sir Home Popham, were extensively used in the Navy; the first edition of the work shows the numeral flags the same as they were in the Admiralty Signal Book of 1799, and in the Library of the Royal United Service Institution there is the copy which was the property of Rear-Admiral Sir Thomas Graves, K.B., who was in the *Foudroyant* until the end of the year 1805. The flags in this book agree with those in the 1799 Admiralty Signal Book, and it is rather curious that they should not have been changed in conformity with the Admiralty Order of November, 1803, altering the official books; but the matter is probably explained by the fact that these Popham Books were at first issued privately, and therefore the alteration was probably not considered necessary. There is no doubt that the same numeral flags were employed for both the Admiralty Signals and the Popham Vocabulary, for a copy of the Popham book is preserved in the Library of the Patent Office with the flags altered to harmonise with those of the Admiralty Signals after alteration in November, 1803. This particular Popham book was, like that at the Royal United Service Institution, one of the early copies; a curious circumstance, however, exists in connection with it, for, whereas possessing the watermark in the paper for the year 1804, the book bears the date of 1803 on the title page; but this latter date is probably wrong, and was due to the printer's oversight.

Confirmation of the fact that the same numeral flags were used for both the Admiralty Signal Book and the Popham Vocabulary Book, is to be found in the UNITED SERVICE JOURNAL for 1829. Here Sir Nicholas Harris

Nicolas, then a lieutenant, writes a pamphlet entitled, "Naval Signals," and, being an officer who had himself been at Trafalgar, the following words are the more important:—"No officer in His Majesty's Navy, of the slightest experience, can be insensible of the important benefit conferred on the service by the introduction of Sir Home Popham's telegraphic vocabulary; and this allusion to the utility of that scientific officer's labours, is not only an act of justice to his memory, but is particularly called for, because his vocabulary is confessedly the foundation of the one about to be noticed. Popham's signals were introduced into the Navy about 1803, as an addition to the code then in use; and from that time to the year 1816, there were two distinct codes, the "General Signal-Book," and the "Telegraphic Vocabulary"; but the same flags were used for each, the use of the vocabulary being marked by the presence of a particular flag."

Again, in further corroboration, if any be necessary, of the fact that the same flags were used for both codes, I might say that I have myself recently seen a small book of signals, giving both the Admiralty Signals and the Popham Vocabulary with only one set of flags for the dual purpose. This particular book bears the watermark in the paper of 1806, and it depicts the numeral flags as used between November, 1803, and July, 1808.

The mistake of the past twenty-three years, or of the past fifty years (however long a period it may have existed for), appears to have undoubtedly arisen from the fact that the original flags of the Popham Code were always adopted instead of those as used after the Admiralty Order of November, 1803. This order, by the way, was repeated by Lord Nelson to his fleet on 16th January, 1804, in the following words:—

"The Lords Commissioners of the Admiralty having resolved that a change of the numeral flags described in page 14 of the Day Signal Book, shall immediately take place, I have it in command from their Lordships to send you a painted copy of the flags as now altered, and to desire that you will paste the same on the 14th page of the Day Signal-Book in your possession, and to use the altered Numeral Flags instead of the Numeral Flags at present in use, until you receive further orders."

It is hardly necessary to point out that Lord Nelson's famous signal was made by means of the Popham Vocabulary, for it would have been impossible to have made it with the Admiralty Signal Book, which contained principally military orders. Also, it is stated in the Naval Chronicle, that Popham's Code was used, and in Vol. 7 of the "Despatches and Letters of Lord Nelson," page 149, it is mentioned "this glorious sentiment, so characteristic of every aspiration of Nelson's mind, was conveyed by Sir Home Popham's Telegraphic Code of Signals."

The remainder of the story of Nelson's Signal is best told in the words of the *Victory's* Signal Lieutenant, Pasco, the officer who received Nelson's orders to make it. The *Victory*,

at the moment, was somewhat less than a mile and a half from the enemy's line.

"His Lordship," Lieutenant Pasco says, "came to me on the poop, and, after ordering certain Signals to be made, about a quarter to noon, said, 'Mr. Pasco, I want to say to the fleet, "*England confides that every man will do his duty.*"' He added, 'You must be quick, for I have one more to add, which is for "*Close Action.*"' I replied, 'If your Lordship will permit me to substitute *expects* for *confides*, the Signal will soon be completed, because the word *expects* is in the vocabulary, and *confides* must be spelt.' His Lordship replied in haste, and with seeming satisfaction, 'that will do, Pasco, make it directly.'

"As the last hoist was hauled down, Nelson turned to Captain Blackwood, who was standing by him, with, 'Now I can do no more. We must trust to the great Disposer of all events, and the justice of our cause. I thank God for this great opportunity of doing my duty.'

"When Lord Nelson's message had been answered by a few ships in the van," continues Lieutenant Pasco, "he ordered me to make the signal for "*Close Action,*" and keep it up. Accordingly, I hoisted No. 16 at the top-gallant mast head, and there it remained, until shot away."

To obviate further mistakes, and to show how the signal should be correctly represented in the future, coloured designs are furnished with this article (see frontispiece) describing how the flags should be hoisted.

WHITEHALL,
1st July, 1908.

NAVAL NOTES.

Home. The following are the principal appointments which have been made: Rear-Admiral—Sir J. Jellicoe, K.C.V.O., C.B., to be Controller of the Navy. Captains—J. C. Ley to "London"; H. L. Mawbey to "Endymion"; R. S. Phipps-Hornby, C.M.G., to "Vernon"; M. E. F. Kerr, M.V.O., to "Invincible"; W. C. Pakenham, C.B., M.V.O., to "Glory"; R. H. Anstruther, C.M.G., to "Cæsar"; A. P. Stoddart to "New Zealand"; J. S. Luard to "Exmouth." Commander—H. G. Lane to "Terpsichore."

Rear-Admiral Sir J. R. Jellicoe, K.C.V.O., C.B., has succeeded Rear-Admiral Sir H. B. Jackson, K.C.V.O., F.R.S., as Controller and Third Sea Lord. Rear-Admiral J. Startin hoisted his flag on board H.M.S. *London* on the 1st inst., as Rear-Admiral in the Channel Fleet, in succession to Rear-Admiral F. J. Foley.

The second-class cruiser *Highflyer* arrived at Plymouth on the 2nd ult. from the East Indies, and paid off at Devonport on the 18th ult. The second-class cruiser *Astræa*, from the China Station, paid off at Colombo on the 7th ult., and recommisioned on the following day for a further term of service on the same station. The second-class cruiser *Minerva* arrived on the 13th ult. at Sheerness from the Mediterranean, and paid off at Chatham on the 22nd ult., recommissioning on the following day for a further term of service in the Mediterranean. The sloop *Cadmus* paid off on the 23rd ult. at Hong Kong, and recommissioned on the following day for a further term of service on the China Station.

Launch of H.M.S. "St. Vincent."—The new first-class battle-ship *St. Vincent* was launched on the 10th ult. at Portsmouth. The only official details published about her are as follows: Length, 500 feet; beam, 84 feet; draught, 27 feet, with a displacement of 19,250 tons. The engines are to develop 24,500-I.H.P., giving a speed of 21 knots. The *St. Vincent* displaces 1,350 tons more than the *Dreadnought*, and 650 tons more than the *Bellerophon*, now completing at Portsmouth, while she is ten feet longer and has two feet more beam than her predecessors. She was laid down on 30th December, 1907.

Hydrographer's Report for the Year 1907. — "The under-mentioned Hydrographical Surveys were in progress in His Majesty's ships and other vessels during the year 1907:—

Home.

Survey.	Ships.
HOME.	
South Coast of England, and West Coast of Scotland	H.M. Ship *Research.*
East Coast of England, North East Coast of Scotland, and Orkney Islands	H.M. Ship *Triton.*
Plymouth and Portsmouth Harbours, and South Coast of England	Hired Steam Launch *Sir James.*
West Coast of England and Scotland, and East Coast of Ireland	Hired Steam-vessel *Gladiator.*
ABROAD.	
British Columbia	H.M. Ship *Egeria.*
English Channel, and West Coast of Africa	H.M. Ship *Mutine.*
Red Sea and Australia	H.M. Ship *Fantome.*
China	H.M. Ship *Waterwitch.*
Red Sea, Penang, and Borneo	H.M. Ship *Merlin.*
Ceylon	H.M. Ship *Sealark.*
Newfoundland	Hired Steam-vessel *Ellinor.*

The number of officers of all ranks employed in the several vessels named amounted to 87, of whom 59 are surveying officers; and their crews to 794.

Allusion is also made herein to the Marine Survey of India, carried on under the charge of Commander W. G. Beauchamp, R.I.M., with a staff of 10 officers, in the two R.I.M. ships *Investigator* and *Palinurus*, with complements of 132 and 47 men respectively.

During the year 1907 no fewer than 508 rocks and shoals dangerous to navigation were reported. Of these, 36 were discovered by vessels striking on them; 117 were reported by surveying ships; 23 by others of H.M. ships; 33 by various British and foreign vessels; and 299 by Colonial and foreign Governments; while in the same period 39 previously reported dangers have been expunged from the charts.

H.M. surveying vessels have been fully employed during the year under review. Two vessels (H.M.S. *Fantome* and *Mutine*) have been commissioned for the first time for the surveying service, and H.M.S. *Sealark* entered upon her second commission.

H.M.S. *Rambler*, *Penguin*, and *Goldfinch* have ceased to be employed for surveying duties, their places being taken by a more modern type of vessel.

During the year 1907 a length of 656 miles of coast line has been charted, and an area of 4,436 square miles has been sounded over by H.M. surveying vessels, the scale of each varying with the requirements of the locality surveyed; while officers of other of H.M. ships have sent in plans and sketch surveys of places visited.

The Indian Marine Survey charted 218 miles of coast line during 1907, and sounded over an area of 1,801 square miles.

Home. On 1st October, 1907, Captain H. E. Purey-Cust was appointed Assistant Hydrographer on the retirement of Captain T. H. Tizard, C.B., F.R.S., terminating a long official career of singular benefit to hydography and to the Navy generally."

France. The following are the principal appointments :—Vice-Admiral —J. J. De Percin to be Commander-in-Chief of the 4th *Arrondissement Maritime* (Rochefort). Rear-Admirals—P. P. Lecuve to be Major-General of the Fleet at Cherbourg; P. G. Forestier to be Member of the Superior Council of the Navy; A. A. Hallez to be Major-General of the Fleet at Toulon; C. E. Motet to be Chief of the Staff of the 2nd *Arrondissement Maritime* (Brest). Capitaine de Vaisseau —J. V. Pradier to "Carnot."

Fatal Gun Mishap on board the French Armoured Cruiser "Latouche-Tréville."—We regret to have to report another terrible gun accident, which has taken place on board the *Latouche-Tréville*, tender to the gunnery-ship *Couronne*, by which 13 men have lost their lives, and 2 have been very seriously wounded. Following so soon after the serious accident on board the *Couronne* last month, this has created something like consternation. The frequency of these accidents is a serious matter for the French Navy, and most disquieting to the country; more especially because in none of them has an exact and definite reason for the disaster been forthcoming. The hypotheses that have been put forward, however well argued, are not convincing, and this cannot but lead to an uneasy feeling in the minds of all concerned.

This is the fourth serious gun accident that has taken place in the last two years, in connection with the Gunnery School at Toulon, the total casualties in which amount up to the large figure of 28 killed, and 42 wounded = 70. The dates and particulars of these accidents are :—

	Casualties.
20th April, 1906, on board the *Couronne*	3 killed, 15 wounded.
2nd August, 1907, on board the *Couronne*	3 ,, 6 ,,
12th August, 1908, on board the *Couronne*	9 ,, 19 ,,
22nd Sept., 1908, on board the *Latouche-Tréville* ...	13 ,, 2 ,,

The following account of this last accident, by an officer on board the *Latouche-Tréville*, who was an eye-witness, is given in the *Temps* :—

"On Tuesday, 22nd September, *tirs d'honneur* were being carried out from the *Latouche-Tréville* off Toulon, for the purpose of selecting the best shots from the men under instruction to receive certificates of Captains of Guns. The guns used were three 14-cm. (5·4-inch) and one of 19-cm. (7·6-inch) in the after turret, and it was in this latter that the explosion took place. The ship had been steaming along a firing base, and had arrived at the end of the run, and was turning 16 points to go back again, and bring the starboard guns into action. The 'Cease fire' was sounded, and as there would be a period of about three minutes before recommencing, advantage was taken of this delay to change the gun's crew; the gun, which was loaded, being left, in accordance with the Instructions, with the breech unlocked. The officer in charge of the first gun's crew warned his

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relief that the gun was loaded, and after this no one can say exactly what happened; but hardly had the new crew entered the turret—not yet quite evacuated by the old crew—when an appalling explosion took place, blowing the breech-block of the gun through the door of the turret, and lifting off the roof-shield, 95-mm. (3·6-inch) thick, which fell on the deck, killing one man, and then bounded overboard. A jet of flame also descended the ammunition hoist to the magazine, luckily without exploding the latter. The inside of the turret, in which every man was killed, presented a horrible sight. The marvellous escape of the two officers is due to the fact that they had just before moved out of the turret to give room for the new crew to pass in.

"It was at first thought that on account of the force of the explosion more than one charge must have ignited, but this was not the case, the other cartridges being found intact.

"One theory is that the new crew, on entering the turret, opened the breech, and that the draught of air into the gun caused gas left in the chamber by previous shots to ignite and fired the charge, while the breech-block, not being closed, was naturally blown out. M. Thomson, Minister of Marine,, on receipt of the intelligence, at once proceeded to Toulon, and has been most unceasing in his attentions in visiting the wounded at the Saint-Mandrier Hospital, who he has decorated with the military medal. One of these two, unfortunately, did not live long to wear this distinction, and has since succumbed to his injuries, bringing the number of deaths up to 14."

The breech-block, which was blown into the sea by the explosion, has since been recovered by the divers from a depth of 22 mètres (72 feet), the percussion tube was found in place, and showed that it had been fired. This discovery would seem to put out of the question the theory of the explosion having been caused by a return flame, and the disaster would now appear to be due to neglect on the part of one of the gun's crew to remove the tube, according to the regulations, before opening the breech, and the tube was probably fired by tension of the tube-lanyard (which may have caught in some way), caused by the withdrawing of the breech-block.

The powder, which had been used up to the 47th round, came from the stock provided in 1899; but that in the gun at the time of the explosion was 1904-1906. A committee of enquiry is sitting, but the conclusions at which they have arrived have not yet been made known; one hypothesis is that the explosion was caused by some deleterious gases, which had remained in the gun. Captain Darrieus, the commander of the ship, declares that he cannot accuse any of the gunners of carelessness, as, as far as was known, all the regulations laid down for firing had been most carefully carried out.—*Le Temps* and *La Vie Maritime*.

The Naval Situation, by M. Rousseau. Letter IV.—The evolution of the *Dreadnought* type of battle-ship still goes on, each Navy endeavouring to produce something better. It is the combination of different qualities which conduce to the superiority of this class of ship. If she be considered simply as a fighting unit, this superiority is not so evident, for it is easy to conceive a vessel of less tonnage able to throw a greater weight of projectiles; but in such a case it would be necessary to sacrifice speed and

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If we admit this, it may be asked: Why have all nations without hesitation adopted these very large displacements? Their adhesion to the principle of the giant battle-ship shows in the clearest manner that no Admiralty has confidence in a purely defensive Navy. The attack on Port Arthur convinced everyone that rapidity of movement and quickness of action is the chief factor in success; and the *Dreadnought* is essentially offensive on account of her speed, and because she is autonomous. The tests through which she has been put after her first trials have amply affirmed this quality. She made a non-stop passage from Gibraltar to the West Indies, and on her arrival on the American side still had enough fuel in her bunkers to allow of her steaming 1,000 miles farther, notwithstanding that her speed had much exceeded the economical limit.

The example set by England has been followed by practically every nation, and now only *Dreadnoughts* are being constructed. In England the situation is as follows: The *Dreadnought*, completed more than a year ago, flies the flag of Vice-Admiral Bridgeman, Commander of the Home Fleet; three other battle-ships (*Bellerophon*, *Superb*, and *Temeraire*) of 18,000 tons were launched in 1907, and will be ready at the end of the current year; three more (*St. Vincent*, *Collingwood*, and *Vanguard*) have just been laid down, and have a displacement of 19,250 tons, and will be completed at the end of 1909 or commencement of 1910; finally, one other battle-ship is to be commenced in the financial year 1908-1909 and finished two years later. Of cruiser battle-ships, three (*Inflexible*, *Invincible*, and *Indomitable*) are afloat, and will shortly be completed; and another of this class of the same displacement—17,250 tons—will be commenced during the present financial year.

Thus, at the end of 1908 England will possess eleven armoured vessels of the *Dreadnought* era, either in commission or completing. This number does not seem so important when we remember that these eleven ships represent a four years' programme of new construction, and if we recall that quite recently Mr. Asquith, in the House of Commons, and Lord Tweedmouth, in the House of Lords, said that the rule of the two-Power standard would continue to be the guide of the Admiralty. We must nevertheless admit that, thanks to the advantage gained by being before other Powers, the British Navy is certainly superior at present to the combination of any other two; but if the new type of vessel has considerably lessened the value of preceding types, it is to be feared that in the near future a combination of two fleets may arise superior to that of England.

But, besides the two-Power rule, the British Admiralty has laid down, according to Lord Cawdor's memorandum, that the "demands of strategy necessitate the production of four large ships per year, and unless unforeseen contingencies arise, this number should not be exceeded. The period of construction of a battle-ship is two years, and as four ships will be laid down each year, in any single year there will be eight vessels of this class under construction, either in the dockyards or private yards."

By 1905 it had become difficult to distinguish between the battle-ship and the armoured cruiser—both were classed under the general description

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of large armoured vessel. Speaking of the intention to construct four battle-ships per year, Lord Cawdor laid this down as the future Admiralty programme, and as, according to the English estimate, the life of a battle-ship may be put at 25 years, it follows that the British Admiralty aim at having an effective force of 100 battle-ships. This may also be inferred from Appendix VII. of the Naval Estimates, which allows for an annual depreciation of 40 per cent per ship, this being also the basis of calculation for the estimated sum necessary for their replacement. (A paper distributed to the British Parliament in July gives the effective number of battle-ships in the fleet as 65, of which 5 are under construction, and the number of armoured cruisers as 38, of which 8 are under construction.) Besides the two-Power standard the Admiralty has, therefore, another guide to work by; but it must be stated, notwithstanding, that the "Navy League Journal" for March shows, as regards the Cawdor programme, that there has since been a falling off of 25 per cent., and that in four years the number of ships laid down will be only 12 instead of 16 required.

If building activity in the British Navy appears to have slackened, this is not the case in the German Navy, whose programme, which dates from 1898, is being continually modified in an increasing sense. The latest change—and, perhaps, the most important—is the one which has received least attention. The life of a battle-ship, which had been fixed at 25 years, has been shortened to 20 years, which means that Germany to replace her worn-out battle-ships will construct five new ships instead of four. If England is losing 25 per cent. per year on her programme, Germany, on the contrary, is gaining that amount, and in 1908, 1909, and 1910 she will lay down four *Dreadnoughts* every year.

The adoption of these large ships has caused a certain amount of perturbation in the German Navy, and the regular sequence of her building programme has suffered in consequence; but the time lost has now been pulled up, and at the end of 1908 Germany will have 9 of these giant ships building or afloat, and one year later she will have 13, which means that if England does not make a further effort she will possess no advantage at the end of 1909 over her competitor.

The following are the details as regards the German *Dreadnoughts*: Two first-class battle-ships of 17,710 tons were commenced in August, 1907, the first of which, the *Nassau*, has just been launched. Two of 19,000 tons and one cruiser of 18,900 tons were commenced in November, 1907, and during the current year three battle-ships of 19,000 tons and a cruiser of 18,900 tons will be commenced. The period of construction of each of these vessels is fixed at eighteen months.

The situation in France is quite simple. Six battle-ships of 18,350 tons were laid down in the end of 1906; they will be completed in 1910 or the commencement of 1911; no others are to be commenced this year, but it is understood that six new battle-ships will be commenced in 1909 and 1910.

The American Navy has only two battle-ships of 20,000 tons actually building—the *New York* and *Delaware*. What further vessels will be laid down depends on the vote of Congress. The Government proposed to commence four battle-ships of 22,000 to 25,000 tons, but it would appear that Congress is not disposed to vote for more than two.

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The building programme of Japan may be compared to that of England. In the first quarter of 1905—that is to say, during the war—two battle-ships, the *Satsuma* (19,250 tons) and *Aki* (19,780), were laid down, and are both now launched. Towards the end of 1907 plans were drawn for two more battle-ships of 22,000 tons and one cruiser of 18,650 tons, and it is proposed to lay down one battle-ship of 22,000 tons and two cruisers of 18,650 tons this year.

There remains Russia, but in the present state of politics in that country it is not possible to say accurately what additions will be made to her fleet.

To resume, at the end of 1908 there will be built the following battle-ships of the *Dreadnought* era :—

—	England.	Germany	United States.	France.	Japan.	Total.
Battle-ships ...	8	7	4	6	5	30
Cruisers ...	4	2	0	0	3	9
	12	9	4	6	8	39

—a total of 39 vessels, of which 20—or more than half—are possessed by England and Japan, whose alliance binds them to act together in case of a combination of the other Powers. On the other hand, England by herself would be outnumbered by any combination except that of France with the United States, though as regards the latter the number of her large battle-ships is not yet definitely fixed.

I have already said that Navies can best be compared by the number and fighting value of battle-ships possessed, as a maritime war must be decided by great naval battles; and the only vessel to act in the fighting line is the first-class battle-ship. But though the battle-ship is the fighting ship *par excellence*, it does not follow that there is no need for auxiliary vessels. Admiral Fournier wished for a fleet composed only of armoured cruisers, but fit to do anything : fight, scout, protect or destroy commerce; but it was pointed out at the time that an armoured cruiser can not be expected to stand up to a battle-ship, and that if used as a scout the cruiser locked up too large a crew and burnt too much fuel; while, as regards commerce protection, so large a number would be required that the price of protection might exceed the value of commerce to be protected. Admiral Fournier did not come out of the region of theory, and France has continued to build vessels of different types, about which it is necessary to say something.

If all are in agreement as to the points of a good battle-ship, there is not the same unanimity of opinion regarding the subsidiary vessels of a fleet. Scouts are allowed to be necessary, but what kind of scout, and in what proportion? In France we are not building any scouts, and the intention is to use destroyers of 330 tons for the purpose; but in anything like bad weather this would lead to the battle-ships scouting for the destroyers. In England they seem to have arrived at some conclusion, and in 1903, 1904, and 1905 a class of scouts of 2,800 tons to 3,000 tons were

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built. It was intended to regularly attach them to the different fleets, but they still remain at the different naval ports, apparently not approved of even before they have had a fair trial. Last year a protected cruiser of 3,300 tons was laid down, and she is to have the same speed as the scouts, and this year five protected cruisers of 4,000 tons to 5,000 tons are being commenced. One vessel also, of 1,800 tons and 30 knots speed, is being built, designated, according to the Estimates, a torpedo-vessel. For what purpose is she intended? Her utility is not clear. What, however, is certain is that she will be more or less of a luxury, and that any large number of this class could not be built.

The United States have also built scouts of 4,000 tons displacement and 24 knots speed, which are now going through their trials. In Japan the same hesitation reigns as in England. In 1907 they launched a cruiser of 4,000 tons and 25 knots; one of 1,250 tons and 22 knots; and one of 1,350 tons and 25 knots. I am not in their secrets, but this appears rather unsystematic. Germany alone is methodically pursuing the construction of small cruisers, and has as many of them as battle-ships. No one knows for what purpose, but it is evident that if the German Admiralty builds so many they have their own reasons. They commenced with 2,645 tons displacement and 20 knots speed, and have raised this to 3,800 tons and 25 knots speed. The new English cruisers would appear to be a reply to the German ones.

The search for the best type of fighting ship leads inevitably to an increase of tonnage, for up to the present all progress tends in the direction of increased weight of engines. It may also be noted as peculiar that the Peace Conference has proved to be a fresh starting point for increased activity in war-ship building and further development in the arms with which they are provided.—*Le Temps.*

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Engineering Instruction in the Navy.—Engineer-in-Chief Charles W. Rae, U.S.N., Chief of the Bureau of Steam Engineering of the Navy Department, includes in his annual report a summary of a report on the instruction of young line officers in engineering which he has submitted to the Chief of the Bureau of Navigation. In his report the necessity of officers specialising in engineering is briefly discussed and mention made of the success which has attended the performance by officers of the line of all engineering duty on board ships in commission. The report says further:—

This duty on board ships in commission is primarily the care and manipulation of machinery, for which the eminently practical education in engineering obtained at the Naval Academy is a most fitting prelude, and reports received from commanding officers bear witness to the success of this plan of having engineering duties performed by officers of the line.

That certain officers should be given further instruction in engineering—in other words, should specialise in engineering—requires no argument, as the nature of the duties demanded of them makes plain the necessity. These duties other than those on board ship, are: Heads of departments of steam engineering at the various navy yards and stations, inspectors of machinery at private building plants, inspectors of material at the

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numerous manufacturing establishments engaged in work for the Government, the designing of machinery at the Bureau, and the inspection of detail designs submitted by contractors, in order to make sure that the requirements of the specifications are complied with in every particular. For these positions an officer must be thoroughly conversant with the profession of engineering, as upon his judgment depends the success of the machinery installation of our ships, as well as the economical expenditure of large sums of money.

Briefly stated, a head of department of steam engineering at a navy yard is the technical adviser of the commandant, and his knowledge of the profession must be such as to inspire confidence in his judgment. He should also be better informed than his subordinates, as a head of department in the hands of his foreman is worse than useless.

An inspector of machinery must follow closely the construction of each separate part, must be able instantly to detect any defective or careless work and call the attention of the contractors to it, must see that the specifications are followed, and in the installation of the finished parts must see that nothing is slighted, and that all the requirements of the design are met.

An inspector of material must have a thorough knowledge of all that his title implies and must be keen to detect the slightest variation from approved methods of manufacture, with which he must be thoroughly conversant.

The designer of machinery must not only be familiar with all the elements of machine design, with current and best practice, but must have that intimate knowledge of the needs of arrangement and installation which can be obtained only by association with the finished product at sea. It is for this reason that the most successful designers of marine machinery are found among those engineers who have had sea experience, who have stood a watch in the engineer department of a vessel in commission, and who have had their existence made miserable by the faulty and academic design of an engineer who has not had experience at sea. On this account the Bureau has always opposed the separation of the designing and of the operating engineer, and it believes that the result of its policy has been attested by the success of its designs. Even where the details of the design are left with the builders, the Bureau keeps a rigid watch over them by a critical inspection of the details submitted before work is begun, this inspection not infrequently resulting in important modifications and in some cases to absolute disapproval of certain details.

That this work may be done and done properly officers with a natural bent for engineering should be encouraged to "specialise in engineering," and should be given the instruction necessary for them to attain that end. With this purpose in view and after careful consideration of the subject, the Department, in 1904, approved the joint report of the Chiefs of the Bureaus of Navigation, Steam Engineering and Ordnance, which provided, among other things, that a certain number of young line officers should annually be detailed for instruction in engineering. Accordingly, a

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class was organised in the Bureau of Steam Engineering under the immediate direction of an officer of marked ability in engineering, and the results thus far secured have been so satisfactory as to reflect great credit upon the organisation of the class as well as upon the officers composing it. Unfortunately, the number assigned to this important work has never been large enough to meet the demands of the Service, and during the past year it was far below the number that should have been detailed. But it is upon this body of officers that the Department must look for the proper performance of the important duties enumerated in the preceding paragraphs, and as it is of the greatest importance that the Government should have among its officers a large number of specialists in engineering, just as it has its specialists in ordnance and torpedoes, it is earnestly recommended that this method of instruction be not only continued, but that the number of officers detailed for instruction be materially increased.

Engineering knowledge is a necessity for the modern naval officer, and the Navy must have engineers, no matter what they are called. To interrupt the present method of obtaining them would be, in the judgment of this Bureau, a retrogade movement and one to be deplored.

General Operations of the Bureau.—The Chief of Bureau points out that the Act of Congress appropriating for battle-ship No. 29 required that the plants for that vessel should be submitted to Congress before the contract for the ship was awarded by the Secretary of the Navy. This condition made the design virtually a competitive one, and the Bureau prepared complete plans and specifications of the machinery for two vessels of different size and power, with reciprocating engines, and two alternative plans with turbine engines. The Department's design for battle-ship No. 28 having been approved, and Congress having appropriated for a sister vessel, No. 29, plans and specifications were prepared in the Bureau for the machinery and boilers of the above vessels, with reciprocating engines, and with turbines, the boilers being fitted to burn either coal, or fuel oil, or both.

Plans and specifications have been prepared and estimates made for the five torpedo-boat destroyers, Nos. 17 to 21, appropriated for in the last two sessions of Congress. For the machinery and boilers of these vessels, the Bureau prepared two complete sets of plans, one with reciprocating engines and one with turbines.

The work of designing new machinery for the 28-foot, 33-foot, and 40-foot steam cutters has been in progress, and the drawings will be completed within a short time. The adoption, by the Department, of these as the standard cutters for the Navy, with increased horse-power in each case has necessitated redesigning the entire machinery; it is expected, however, that much improved and more efficient installations will be the result.

The Chief of Bureau considers that the success of the designs made is largely due to the rigid inspection and to the enforcement of the requirements of the plans and specifications. The examination of the working drawings of the machinery of vessels under construction and

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undergoing repairs entails a vast amount of work upon the limited force allowed. When it is considered that within the past year nearly 3,000 plans have been carefully examined to see that the designs shown were in strict accord with the contract plans and specifications, an idea may be formed of the importance of this branch of the Bureau's work.

Within the past year the actual machinery weights have been tabulated and the centres of gravity computed in detail for fifteen naval vessels, and the estimated weights and centres of gravity computed for six new vessels; much work has also been done in tabulating results for use in estimating weights of machinery for proposed vessels, in working out and tabulating standards, in preparing curves of speed, power, steam consumption, etc., and in tabulating data. The importance of this branch of work is attested by the frequent requests from schools and colleges for such information, which requests the Bureau is inclined to consider favourably when not contrary to the interests of the Government.

The work on the three scout cruisers now building, two fitted with steam turbines and one with reciprocating engines, is progressing favourably, and it is hoped that in its next annual report, as a result of the competitive trials of these three vessels, the Bureau may be able to make definite recommendations on the use of turbines for naval vessels.

Speaking of the Engineering Experiment Station at Annapolis, the Chief of Bureau states that an interesting piece of apparatus added to the equipment is a CO^2 recording instrument, much used in recent years in power houses, manufacturing establishments, etc., to check the work of firemen. It is comparatively easy to operate and is to be tested for the accuracy and uniformity of its results. If satisfactory in these respects, it will be of great value in testing the qualifications of coal passers and firemen for promotion, an instrument being installed at each navy yard in connection with any boiler. The firemen from the ships at the yard can then make their own record under the supervision of a warrant officer. As a first step towards finding a simple and reliable means of testing coal for naval purposes at the yards and for the fleet on foreign stations, a calorimeter has been purchased which is almost as accurate as the well-known "bomb" coal calorimeter, and, at the same time, of simpler construction and more easily operated. The necessity for testing coal before purchase is so obvious as to hardly admit of argument. The difficulty in the way at present is to find a method that can be carried out in practice by officers of the ships and at coal depôts.—*Army and Navy Journal.*

MILITARY NOTES.

Home. The following are the principal appointments which have been made:—

Major-Generals—A. R. Martin, C.B., I.A., to be a Divisional Commander, India. R. L. Scallon, C.B., C.I.E., D.S.O., I.A., to be Adjutant-General, India.

Colonels—C. H. Powell, C.B., I.A., to be a Brigade Commander, India. W. E. Peyton, D.S.O., to be a Brigade Commander, India, and is granted the temporary rank of Brigadier-General whilst so employed. K. S. Davison, C.B., I.A., to be a Colonel on the Staff, India, and is granted the temporary rank of Brigadier-General whilst so employed. H. P. Hickman to be Inspector of Coast Defences and Garrison Artillery, India, and is granted the temporary rank of Brigadier-General whilst so employed. H. V. Cox, I.A., to be D.Q.M.G., India. F. P. Hutchinson, I.A., to be A.A.G., India. A. F. Hogge, C.B., I.A., to be A.A.G., India. Sir C. Fergusson, Bt., M.V.O., D.S.O., Brigadier-General, General Staff, Irish Command, to be Major-General.

Queensland. *Military Forces.*—Steps were taken, upon the separation of the Colony of Queensland from New South Wales, in 1859, to provide for defence. A troop of mounted rifles was raised in March, 1860. The service was voluntary, and the force quickly increased, infantry and cavalry, subsequently supplemented by artillery, being formed of "volunteers." Grants for efficiency and a capitation allowance, with free issue of ammunition, were obtained from the Government; and orders granting fifty acres of land were available upon completion of five consecutive years of service. In 1876 the total strength was 415. The Volunteer Act of 1878 provided for the raising of a force of defence, and many citizens entered upon useful and regular training. In 1880 the total strength was 1,219 of all ranks.

But the volunteer system in Queensland, as elsewhere in Australia, was superseded. In 1883 a Military Committee of Inquiry, appointed to consider the basis of service, reported against the system as lacking in cohesion and discipline, and in 1884 the Volunteer Act was repealed. All male inhabitants within specified ages, and with certain exceptions, were liable to serve. A small permanent corps was authorised, and the formation of partially-paid militia and volunteer corps was provided for. Under the new system the force was greatly augmented, and a higher degree of efficiency was reached. Subsequent legislation crystallised the defence system of the Colony. The total strength on 31st December, 1900, was 4,028, made up as shown in table hereinafter :—

Establishment and Strength of Military Forces of Queensland, 31st December, 1900.

State.	Establishment.		Strength.	
	Officers.	Other Ranks.	Officers.	Other Ranks.
Queensland	310	5,035	291	3,773

France. *The Grand Manœuvres of 1908: The Ten Months' Reservists.*—The manœuvres are over, and the reservists have returned to their homes. The following are some of the impressions made by them, which are noted in *La France Militaire* :—

The calling out of reservists this year is of exceptional interest, the men called out having only completed ten months' service with the colours; their number was considerable, and more than one company exceeded war strength. Some reservist, or unemployed, under-officers and corporals came to complete the peace cadres, but their numbers were insufficient for these large company units. The question as to how they shaped at the manœuvres was a most important one from every point of view, but especially with regard to the possibility of one year's period of service.

At first sight these unwieldy companies appeared to march well, after the weeding out process of the first three days. They deployed with fair regularity, but slowly; the ground was, on the whole, made pretty good use of. In short, there was order, a little dash, and a certain amount of silence. Taking into account the numerical insufficiency of the cadres, the general impression was not a bad one.

The following is the opinion of officers on the active list, to whose unceasing zeal and devotion the polish mentioned above was due :—

Four-fifths of these reservists merely retained a confused recollection of the teaching they had received in the Regular Army. They soon recovered the habit of obedience to the word of command, and that is why the mechanism of the movements was executed with regularity, but with great slowness. These men, for the most part, also evinced good humour, zeal, and endurance, to a certain extent. These are, it is true, excellent qualities, and explain the good appearance made by the companies; but whatever one may say, it was merely an appearance.

If one closely followed one of the sections of 60 or 70 men, it was soon apparent that the basis of instruction, so to speak, did not exist. They were deficient in combination in action, in the desire to comprehend the wishes of the commander, and to assist in the execution of an order to the greatest possible extent; they were lacking, too, in respect for uniformity, both in firing and in advancing. As soon as they had escaped from the immediate supervision of the section commander, these men ceased paying attention to the objective laid down, did not raise or lower their sights, extended on the ground with indifference, without attempting to follow the enemy by sight; and all this, not on account of indiscipline or bad will, but solely from ignorance and lack of intelligence of their duty as combatants.

It was even worse with regard to security service. Whether they were sentries or scouts, their ignorance of the most elementary rules was lamentable. They had forgotten, and the 15 days' preliminary drills was insufficient to refresh the memory. One could not even dream of sending them out on patrol duty.

As regards night work, a grand guard entrenched in a village was attacked at about 2 a.m. The confusion was great, although the outposts, well commanded, gave the alarm in ample time. There was the greatest difficulty in grouping the units properly, in conducting them to their posts, and in obtaining order and silence. Even the well-trained men

France. of the Regular Army found great difficulty in resisting the depressing influence of their elders.

In cantonments, in all the details of daily life, constant supervision had to be exercised, to make these soldiers keep their equipment, boots and arms, in a proper state. Their one idea was to sit down as quickly as possible in a neighbouring inn. As regards the cooking, that was someone else's affair; that of the men of the Regular Army!

Germany. *Staff Rides.*—Staff rides take place every year for the instruction of officers, without troops, and include grand general staff rides, army corps staff rides, fortress staff rides, and administration staff rides. In addition, exercises are held every year amongst members of the Grand General Staff with the same object.

The rides of the Grand General Staff take place under the direction of the Chief of the Staff of the Army. Those participating in them are, for the most part, officers of the Grand General Staff; but at the wish of their commander, other field officers may also take part in them. As a rule, one or more officers of the commissariat attend them.

Army corps staff rides take place once a year in each army corps which does not participate in a great fortress staff ride. They are under the direction of the Chief of the Staff of the army corps. Those taking part in them are, in the first place, all officers of the staff of the district in which the army corps in question is quartered. In addition, infantry, jaeger, cavalry, field and foot artillery, as well as pioneer officers attend them in proportion as those arms are represented in the army corps. This calculation is made by taking as a basis the number of companies, squadrons, and batteries in the army corps; out of 16 of these groups, 1 officer is usually selected. Each machine gun detachment counts as 1 group to be added to the infantry or jaegers. Communication troops are reckoned with the army corps of their district; but the Berlin communication troops are an exception, and are reckoned with the IVth Army Corps. Should the number of the groups be less than 16 for a certain branch of the Service, and an officer of it can, consequently, not take part in a ride, it is made up to that branch the following year.

In army corps staff rides, then, the following proportion participate: for 160 groups, at least 10 officers; for 161 to 176 groups, 11 officers; for 177 to 192 groups, 12 officers; and so on in the same proportions. There must be at least 2 line officers at each ride, and when the number taking part exceeds 13, 3 staff officers. The other places are given, as far as possible, in equal proportion to captains or squadron commanders and lieutenants. In addition, every year 4 professors from the war school and the central cadets' school take part in these rides. The following may, in addition, participate: for the Guards and the IIIrd Army Corps, alternately, an officer of the Military Technical Academy; for the IVth Army Corps, an officer of the Field Artillery School for Gunnery; and for the IIIrd Army Corps, every four years, an officer of the Foot Artillery School for Gunnery. Finally, the Chief of the Grand General Staff is authorised to exceed the above numbers and to nominate even more officers to take part in these rides.

Army corps staff rides last, as a rule, for 17 days, including going and returning, and usually take place in the district of the army corps.

Germany. As regards fortress staff rides, the Chief of the Army Staff annually selects two army corps to take part in a grand fortress staff ride. He may, in addition, each year organise a small fortress staff ride. The following generally take part in a grand fortress staff ride: 1st, *for the direction*, 1 quartermaster-general, with his adjutant; some staff officers, 1 officer of foot artillery, of the engineers and of the lines of communication troops, and 1 commissariat field officer; 2nd, *for the offensive*, the Chief of the Staff of an army corps or district, who directs; officers of that army corps staff, including those of the district fortresses; 2 infantry staff officers or captains; 1 field artillery and line of communication staff officer or captain; 1 to 2 foot artillery, engineers or pioneers staff officer or captain; 3rd, *for the defensive*, the same as for the offensive, with the following exceptions: no officer of field artillery, only 1 staff officer of foot artillery, no captain of engineers or pioneers, but 1 to 2 staff officers.

In addition to this *personnel*, an infantry officer, professor at the War School, or from the Central Cadet School should take part in this ride. The number of those participating in the small fortress staff rides is rather more limited; with this restriction the Chief of the Staff of the Army may vary their number by increasing or decreasing them. The direction of these rides devolves on the Chief of the Staff of an army corps or district, or on the chief of a section of the Grand General Staff.

Grand fortress staff rides usually last for 12 days, including going and returning; small fortress staff rides should not exceed 10 days.

There are usually 4 administration rides a year. They are directed by an officer having the rank of an officer commanding a regiment or brigade, and selected by the Chief of the Staff of the Army. The following officers, without exception, take part in them: 5 staff officers, a transport officer selected from amongst the most senior, and 6 commissariat field officers. The Chief of the Staff of the Army may, in addition, order an infantry staff officer and a senior medical officer to take part in these rides.

Officers of the Grand General Staff and officers doing duty with it participate in courses of exercises of the Grand General Staff. The number of those taking part is decided by the Chief of the Staff of the Army.—*Internationale Revue über die gesamten Armeen und Flotten.*

Purchase of Horses for the Remount Service in 1907.—The 1907 remount operations were carried out with facility, and there is no indication of any diminution in the importance attached to the breeding of horses for military purposes.

27,121 young horses were brought forward in the whole extent of the Empire; out of this number 13,445 were purchased, making a proportion of about 50 per cent. The numbers, according to the various States, were as follows:—

	Brought forward.	Purchased.
Prussia	23,376	10,807
Bavaria	1,886	1,417
Saxony	1,429	959
Würtemberg	430	252

Germany.

Prussia.—Eastern Prussia heads the list with 12,098 young horses brought forward and 6,409 purchased, chiefly for the cavalry.

Hanover comes next with 2,661 brought forward and 1,209 purchased; the Hanoverian young horses are more especially meant for heavy cavalry, cavalry of the line, and field artillery.

The two Grand Duchies of Mecklembourg come third on the list; they brought forward 2,101 horses, of which 910 were purchased. These horses are, for the most part, exported from Hanover, a few from Holstein, as colts and reared in the excellent pasturage of Mecklembourg. Horses native to the State are few; the old and renowned race of Mecklembourg horses no longer exists.

The province of Posen is placed fourth with 1,871 brought forward and 786 purchased. In this province, except in the parts producing beet for sugar, they are rapidly giving up the risky breeding of heavy draught horses; they go in for the more ordinary breeding, and the good results become more marked year by year. The large breeders are the large landed proprietors.

Fifth in order comes Schleswig-Holstein, which, out of the 1,481 horses brought forward, sold 493, of which some 35 were heavy draught animals of the Schleswig breed. The relatively small percentage of purchased horses gives no idea of the value of the animals brought forward; it should be remembered that Schleswig-Holstein especially breeds heavy draught horses, and coach and strong carriage horses can only be used for field artillery.

Western Prussia follows with 1,285 horses brought forward and 433 purchased.

The horse breeding in Silesia, Pomerania, and Brandenbourg did not amount to much. These provinces brought forward 114, 147, and 211 horses respectively. Rhenish Prussia, which breeds heavy draught horses, only brought forward 32 horses for foot artillery. Oldenbourg, rich in horses, only produces a small number of horses for field artillery (in 1907 73 horses). On mobilisation this province would render great services to the Army with its heavy draught horses, but during peace time the greater portion are too heavy to be employed for the instruction of the drivers. The horses purchased during peace are good, especially if proper care is taken in the shoeing.

From the number of young horses brought forward, one may conclude that the development in the breeding of heavy draught horses exercises no adverse influence on horse breeding in general. As regards the value of the remount, there is no criticism to be offered.

Bavaria.—The efforts made in Bavaria to create a national breed of horses have given good results. At the same time, they almost entirely confine themselves to the production of draught horses for artillery. The production of saddle horses is small. These are bred at the Rohrenfeld Royal Stud Farm, at the two stud farms at Achselschwang, and Zweibrücken, at the stud farms of Count Moy, at Stepperg, and of Baron von Rotenbau, at Rentweinsdorf, as well as at the dozen horse-breeding establishments. For cavalry remounts, Bavaria draws on Eastern Prussia, and completes her complement of draught horses from Holstein and the Hambourg country.

Germany. In Bavaria itself, out of the 668 horses brought forward, 375 (or 56 per cent.) were purchased. The average price was 1,018 marks (about £51) for draught horses for artillery, and 928 marks (about £46 8s.) for saddle horses; in addition, 10 heavy draught horses for foot artillery were purchased at an average price of 1,300 marks (about £65).

The horses sent by Eastern Prussia to Bavaria amounted to 837 purchased out of 971 brought forward, or 86 per cent. The average price was 907 marks (about £45 7s.).

The acquisitions from Holstein and the Hambourg country were 205 horses purchased out of 247 brought forward, or 86 per cent., and the average price was 1,023 marks 50 (about £51 3s. 6d.) per draught horse, and 1,250 marks (about £62 10s.) per brood mare.

Saxony.—There were purchased for Army requirements:—

In Saxony itself, 81 young horses, out of 260 brought forward.
In Eastern Prussia, 762 out of 981.
In Western Prussia, 10 out of 20.
In Bavaria, 17 out of 32.
In Holstein, 89 draught artillery horses out of 136.
In Schleswig, 6 heavy draught horses for foot artillery.

Würtembourg.—With rare exceptions, Würtembourg draws her cavalry horses from the Prussian remount depôts, whilst purchasing her draught horses for artillery partly in the country itself and partly in Western Prussia and Schleswig-Holstein.

The 252 horses acquired in 1907 came from these various States in the following proportions: Würtembourg, 93 horses; Western Prussia, 96 horses; Schleswig-Holstein, 63 horses.

In addition, 255 young cavalry horses came in 1907 from the Prussian remount depôts.—*Revue Militaire des Armées Etrangères.*

United States. *Machine Guns.*—The *U.S. Army & Navy Journal* publishes the following rules for umpiring machine guns:—

General Character.—Machine guns are used only as auxiliaries to the other arms, not as the principal reliance of the commander.

Effective Ranges.—Their extreme effective range may be taken as about 2,500 yards, as now developed and used in our service. In exceptional cases, where circumstances permit observations of fire in order to correct the aim, generally from another point and communicated by telephone or telegraph, or when circumstances permit the use of indirect fire observed and reported from another point, the limit of 3,000 yards may be reached; but such cases are exceptional. Their maximum effect is obtained at ranges from about 1,200 yards down to short range, since it is generally practicable for pointers to correct aim according to effect of fire.

Classes of Fire.—The fire of machine guns is classed as: *Direct*, when aimed directly at a visible object. Its use is obvious. *Indirect*, when aimed at an object not visible to the gun pointer. Useful against reserves and considerable bodies of the enemy, when observation is possible. *Canopy*, when directly over the heads of a portion of our own troops. Used to cover assaults when the ground is favourable. *Continuous*, when the pressure on the trigger is maintained, pauses being made only for

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belts, jambs, oiling mechanism, etc. Used in critical moments, when important targets are visible. *Intermittent*, when pauses are made at intervals of twenty-five to fifty shots for observation of fire effect and correction of aim. Used normally, at fleeting objectives; is the usual trench or position fire. *Fixed*, where the gun is aimed at some definite object and clamped. Used in exceptional cases against definite objectives, as at a bridge, a piece of artillery, an embrasure; at night to sweep a road, and the like. *Traversed*, where the piece is slowly traversed from point to point of the field of fire. Used to cover a trench, against a skirmish line, against varied objectives which appear and disappear. *Zone*, where an area is to be searched with fire, involving both traversing and changes of elevation. This fire is best conducted with several pieces at once, each piece using a different elevation. From 50 to 100 yards is the right difference of elevation to use. Used to cover a given field, as a wood, a rolling foreground, a deep formation of the enemy, etc.

Selection of Class of Fire.—The effect of the fire of the gun depends to a great extent upon the selection of the right class of fire, the accuracy with which distance is estimated, and the skill of the pointer. All these factors must be taken into consideration in judging the amount of damage inflicted upon the enemy. Hence, before estimating the loss occasioned by machine gun fire, the umpire must consider whether the class of fire used was suitable for the objective, the accuracy of the estimation of the range, whether the fire was opportunely delivered, and the efficiency of the gun service. It is always necessary for the commander of the machine guns to show that due attention has been given to ammunition supply; for if that fails, there is no fire. This must be shown affirmatively.

Selection and Occupation of Position.—The effect of machine gun fire is greatly increased if good choice of position and approach has enabled the guns to use the element of surprise or suddenness. If several guns can be opened from a concealed position where their presence is not suspected by the enemy, simultaneously, with accurate estimate of the range and plenty of ammunition, the maximum effect must be awarded. Just in proportion to the disregard of these conditions, or the impossibility of fulfilling them, the effect awarded must be reduced.

Tactical Control.—Tactically, machine guns should be controlled as far as possible by direction of higher commanders, in order that the great weight of their fire may be applied at critical moments and decisive occasions, and not frittered away on trifling objectives. Therefore, the tactical director of the combat, whoever he may be, should determine the objectives and the time of the machine guns to enter the combat. The tactical director of the combat may be a battalion, regimental, or brigade commander, according to the circumstances. He issues the general instructions for the guidance of the commanders of machine guns, and he determines when they enter action; after that, the conduct of the machine guns rests largely in the hands of their immediate commanders, who must follow the plans indicated in the instructions above noted.

Tactical Management.—The immediate tactical management of the machine guns is vested in their commander, who handles them with the simple object of inflicting the maximum loss upon the enemy. He selects the local objectives, the local firing positions, controls the amount

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and kind of fire, advances or withdraws his guns, looks after the ammunition supply, and is responsible for the most efficient and effective use of his command.

General Methods of Using Machine Guns.—There are two general methods of using machine guns in combat. The method to be used is controlled by the tactical director of the combat, who indicates his views or issues his orders to the commander of machine guns. (*a*) With the firing line, to increase its fire action, from the beginning throughout the fight. In this case the guns should be sent out in small units, two or more guns with a battalion, regiment, or brigade, and the commander of the guns will be subordinate to the commander of the unit to which his guns are attached. (*b*) As a reserve, supplementing the firing line, held in the hands of the tactical director of the fight for use at opportune times and places. In this case, companies of machine guns are usually held intact until sub-divided by his orders, and are not under the orders of any commander of any subordinate unit. The instructions of the tactical director of the combat should be clear as to which method he will use; and umpires will judge of the conduct of the guns in accordance with these instructions. In the first case, the principal responsibility of the captain of a machine gun company is to get ammunition and water forward to his platoons, which are fought by the platoon commanders according to local instructions. In the second case the company commander is usually charged personally with fighting his guns, under the general instructions received. Umpires judge accordingly.

Use of Machine Guns in Attack.—The uses of machine guns in attack are fourfold. (*a*) To support the firing line, entering the combat as soon as targets are presented, advancing among its elements, and supplying as much of its fire as practicable in order to relieve the infantry of as much long-range fire as possible, and augment their fire at mid-range. (*b*) To cover the assault by machine gun fire. For this purpose favourable positions must be selected at about 1,000 yards, and canopy fire is used. Only the most skilful pointers will be allowed to fire, and under the direct charge of commissioned officers of the machine guns. (*c*) To reinforce the infantry at the earliest possible moment on the captured position, fire upon the retiring enemy, and defend the position against counter-attack. (*d*) To establish a rallying line in case of repulse, which will be the new line of resistance. As soon as a repulse is evident, the machine guns on this line will be hastily intrenched, and preparations made for desperate resistance. These preparations should include placing quantities of ammunition and water in the gun pits; establishment of belt loaders near the guns under cover; taking of animals to convenient cover; looking after food and shelter for men, etc. Umpires will judge of the efficiency of machine guns in accordance with the preparations made, or assumed to be made, in such cases.

Use of Machine Guns on the Defensive.—The tactical use of machine guns on the defensive conforms in principle to the last case above cited. The use of the guns in first or second line, and time of entering the combat, are determined by the tactical director of the combat, who also determines whether he will hold some or all of the guns under his own control, or will distribute them among the sub-divisions of his command, according to the circumstances of the case. The actual conduct of the machine guns

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is in the hands of the machine gun officers, subject to the foregoing principles. On the defensive, when the guns can be intrenched in favourable positions, consolidation of a considerable number of machine guns under one officer designated by the tactical director of the combat, is permissible.

Tactical Director.—The tactical director of a combat means in the foregoing the officer charged with conducting the fight in a given portion of the field of battle. Such officer may or may not be the commander of the whole force; but should be designated by him when the fight is not conducted by the commander in person. Thus Generals Lawton, Chaffee, Ludlow, Kent, Sumner, Hawkins, and Pearsons may be considered tactical directors of combat in limited portions of the field of battle at Santiago, for purposes of illustration; though General Shafter commanded the whole force and indicated in a general way his instructions for the combats of 1st July, 1898.

With Advance Guards.—With advance guards, machine guns should march with the support or reserves, according to the circumstances and orders of the commanding officer. They are under the orders of the commander of the advance guard. They are handled tactically by their own officers, under the direction of the commander of the advance guard.

With Rear Guards.—With rear guards machine guns march with the reserves. They are under the orders of the commanding officer of the rear guard, and are handled by their own officers under his instructions. They should fire vigorously from selected positions, to force deployments, then pack and get away rapidly to avoid losses. In this way they contribute most effectively to the function of the rear guard, which should delay the advance of the enemy, force repeated deployments of his forces, and retire "with a sting in its tail."

On the Outpost.—On outpost duty machine guns are placed on the line of resistance, and their use conforms to the principles of the defensive combat. They are under the orders of the commander of the outposts, but handled by their own officers.

On the March.—On the march machine guns follow the units to which they are attached. The machine guns of a battalion may be directed to march in rear of the regiment, as a matter of convenience, in route marches; but when near the enemy must join the unit to which they are attached.

Award of Losses.—The amount of damage inflicted upon the enemy must be adjudged upon the facts in each case, taking into account whether the guns have been used in accordance with correct principles. It is not practicable to establish an equivalent for a machine gun in terms of other troops; nor is it desirable to do so. They are auxiliaries, not intended to replace other troops; and the conditions of their effectiveness are different from those of other troops. Each case must therefore be adjudged on its own merits, with due weight given to number of guns, choice of position, accuracy of range ordered, ammunition supply, and character of target presented.

Based on the foregoing considerations and on *data* obtained by various experiments, the following observations are suggested as reasonable guides to sound umpiring of machine guns in manœuvres: (*a*) When all the conditions are favourable, and a machine gun is correctly handled, below 1,200 yards, the maximum loss to be awarded may be conservatively stated

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to be greater than if thirty riflemen were firing. The longer the range the greater the advantage of the machine guns, up to extreme range. (*b*) The loss awarded must be reduced if the gun is not well handled, in accordance with the principles above explained. (*c*) At extreme ranges, beyond 1,200 yards, up to 2,500 yards, the gun is more effective, as compared with riflemen than at short ranges—worth twice as many riflemen. (*d*) The sudden and unexpected fire of a machine gun is very much more destructive and demoralising than the same fire when expected by the enemy; the effect is still more increased. Allowance will therefore be made for greater losses inflicted by machine guns in such cases. (*e*) The fire of machine guns against a partially concealed line of skirmishers is not very effective. Little loss will be awarded; but it is otherwise if the fire is held until the skirmishers expose themselves. In that case great loss must be awarded. (*f*) Machine guns trying to advance below 800 yards in pack under infantry fire must be ruled to suffer heavy losses. (*g*) One minute may be assumed as a fair allowance from pack to aimed fire by a machine gun. This is often important in determining whether the gun was able to fire upon an indicated objective or not. (*h*) Under fire from field artillery, beyond its own effective range, a machine gun must either advance under cover, intrench, or withdraw. If it does neither it must be ruled out. (*i*) Against artillery within effective machine gun range, machine guns have the advantage, piece for piece, except in the case of a frontal attack with the artillery "in battery." (*j*) Against infantry, the ruling must be based on the circumstances, remembering that infantry in mass is at the mercy of a machine gun, while the machine gun itself is best assailed by snipers, against which it must be protected by a few sharpshooters operating in the same manner. (*k*) The supply of ammunition available for the machine guns and the number of rounds fired must always be taken into account. (*l*) Against cavalry within machine gun range, the machine guns being formed for action, cavalry must always be ruled out of action. If the cavalry charge takes the machine guns by surprise in pack and approaches to within 300 yards in formation for charge, the machine guns must be ruled out of action.

CORRESPONDENCE.

"A PAIR OF PROPOSALS FOR THE TWO BRITISH ARMIES."

To the Editor of the JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION.

SIR,—If a nation usually gets the kind of Government it deserves, it is equally true that it usually gets the kind of Army it deserves. Here we are in the middle of a short year that is pregnant of the fate of the voluntary system, and already the great majority of the people seem to have lost all interest in the military problem. Owing to our vast tropical and over-sea possessions, our problem is the most intricate of all national military problems; even if we had a system of compulsion, our problem would still remain the most difficult of all.

The 300,000 Territorials, for whom Mr. Haldane called, are still one-third in default; 300,000 was laid down as the minimum for safety. Many people gravely doubt whether there will be anything like 200,000 after the 1st of April, 1909.

To some extent, it is true, a lack of numbers can be made up for by high quality, as we found in South Africa; but can our Territorials, with their less-than-Militia training, be reckoned of high quality? In spirit they can, but not in tactical quality. Every infantry company of them, every squadron, every battery of artillery, would be worth 50 per cent. more in war, if it had a substantial addition to its ranks of veteran, highly-trained soldiers. Ask any commander of a Territorial battalion what would be the increased value of his unit if every company had in it twenty-five fully-trained soldiers and two or three non-commissioned officers.

One of the objects of this paper is to show that this welcome addition can be got without trouble, and with very little expense.

The British soldier enlists for 7 years with the colours and 5 in the reserve. He is then only from 30 to 33 years of age, and is still eminently fit for the field; but the War Office lets him go and loses him. In Continental armies the soldier is kept under obligation to serve until a much later age and a sprinkling of these veterans among the young troops will be of very great advantage in war time.

The proposal is that the Regular shall enlist for 7 years with the colours, 5 years in the Reserve, and 5 years in the Territorial Army; that he shall not only be liable to be called out with the latter for war, but shall, during his 5 years, be a complete Territorial in the matter of the annual camp and the musketry course. If he serves as a non-commissioned officer he shall also attend the drills, and shall be paid for that work.

It is hardly to be supposed that this extra obligation of 5 years' Territorial service would seriously affect recruiting. Few recruits consider seriously what is going to happen 12 years after their enlistment, and a considerable inducement could be held out to them of the following kind. If, during a man's 5 years in the Territorials, a great war occurred, necessitating the embodiment of the Territorials for active service, then the old soldier would become eligible for pension to the end of his days—a military pension, that would in no way preclude his obtaining the civil Old-Age Pension when he arrived at the age for it.

Let us now see what number of these Regular-Territorials can be counted upon. The number of men transferred annually from the colours to the Reserve is (I speak from memory) about 23,000. We shall be on the safe side in taking 20,000 as the number discharged five years later from the Reserve into civil life. Out of these, exemptions on various accounts would have to be made; it would hardly, for instance, be fair to prevent a man from emigrating to a British possession where he had work waiting for him. The question of health, too, might weed out a certain percentage. Let us take 15,000 as the annual number who would join the Territorials. Serving thus for 5 years, there would be 75,000 veteran, highly-trained soldiers eventually belonging to the Territorial Army. This is exactly one-quarter of the proposed strength of the Territorials; every company of infantry could have 25 non-commissioned officers and men of this high quality in its ranks. Owing to the paucity

of Regular cavalry as compared with the Yeomanry, nothing like the same proportion would be here available from the Regulars for the Territorials. Nor would the Territorial Field Artillery obtain so large a proportion as 25 per cent. of its *personnel*, if it be decided to adhere to the enormous number of 15-pounder batteries, which the scheme lays down for the Territorial Army. The total *personnel* of a field battery at war strength is 173 in rank and file. There would be sufficient Regular field gunners passing annually from the Army Reserve to provide a reinforcement of 10 per cent. to each Territorial battery. Each gun could get one good layer and one leading gun-driver, with some five or six skilled gunners over for the battery in general.

It must be remembered that these men—infantry, cavalry, artillery, engineers—would not suddenly appear in the units at war time. The plan is that they belong to the Territorials all the time of their five years' liability. They would not do the ordinary drills of the Territorials—that would be an absurd tax to impose upon them—but they would join their units for camps and manœuvres, and also shoot with them. They would thus become acquainted with their Territorial comrades and with their new officers, and would be of the greatest help to the latter in camps.

The above proposal, thus roughly sketched in outline, seems to the writer to be free from the danger of becoming a shuttlecock of party politics. The same cannot unfortunately be said of the proposal which follows, for whenever it is mooted in the presence of any politicians, one always hears the fear expressed that it would be resisted tooth and nail by the ——— Party. To the writer the cause of such opposition has always been a mystery; but there is such a thing as "cussedness."

The proposal is simply that every man, on passing through the Regular Army and being tranferred with a good character to the Reserve, should be *entitled* to a civil appointment under Government; that the man in fact should, as a matter of course, serve first as a soldier and then as a civilian.

I do not intend on this occasion to exhibit the figures that show that there is, in the control of the Government, a number of appointments sufficient to provide for an arrangement of this kind. Careful study of a number of Blue Books, reporting the researches and conclusions of several committees and commissions that have during 20 years past considered the question of the employment of discharged soldiers, show not only that the latter can be provided for in the way proposed, but that those Government Departments who have been employing old soldiers report most favourably on them in their civil capacities.

A pecuniary argument in favour of the proposal is that this is not a case of creating posts and drawing on the public purse to pay their holders; all of these posts must exist, and the reservist's or discharged soldier's pay or pension can be wholly or partially saved.

An objection that is heard is as follows: that if a public service, such as that of the postmen, was entirely or very largely manned by old soldiers, a frightful dislocation would occur on the outbreak of a war that required complete mobilisation; that, if the Metropolitan Police, for instance, was so manned, there would be immediate chaos in London on the day of mobilisation. This fear is the result of incomplete thinking. These civil servants usually remain in their service till the age of 55;

many, such as doorkeepers, messengers, caretakers, to a greater age. The soldier, enlisting at 19, would enter his civil appointment at 26; from 26 to 31 years of age he would be an Army Reservist; from 31 to 55, he would remain in his civil appointment even in time of war. (This ignores for the present the 5 years' Regular-Territorial proposal with which this paper commenced.)

For 5 years out of 29 (55 *minus* 26) he would be liable to be taken from his civil employment; and we may, therefore, conclude that one-fifth only of the civil servants would be snatched away for war—one-sixth on the bare figures, but allowance is made for death and disability.

If the Regular-Territorial proposal were in force, the proportion would naturally be much higher, say, 2 civil servants out of every 5. Compromises would have to be made in particular parts of particular departments, some men (who, it must be remembered, are fully trained soldiers already) being held back in their civil posts until the Territorial Army urgently needed them.

Our voluntary system is very expensive, Government having to compete for recruits in the open market of labour. Under this system the army must remain comparatively small; it is all the more important, therefore, that it should be of the best quality. Before the end of their 7 years' colour service our men are quite a match for any foreign troops; in the opinion of the writer a British battalion or battery, with a large proportion of 5, 6, and 7 years' men in its ranks, is far superior to an average foreign unit. But it is undeniable that the raw material we get is much below the average of the manhood of the country in physique, intelligence, and education.

Under a system in which a man served first as a soldier and then as a civilian, the youth would see before him an assured future. At once, on the inception of the system, the recruiting offices would be besieged by applicants far in excess of the number required, and by applicants from a class of the population excelling the present applicants in physique, intelligence, and character. The Army could begin to pick and choose, and would fill its ranks with first-rate material, and the Civil Service would certainly be as well off as it is at present. Why should not the Army have the right to claim the best manhood of the nation?

With the present establishment of strength the Army might be cheaper than before, for the daily pay of the soldier might be reduced as a set-off to the security of his future. His pay, also, as a Reservist, would be saved.

To sum up:—The Regular-Territorial proposal would, if adopted, greatly improve the quality and numbers of the Territorial Army, and it would be done at a very small expense; the Soldier-Civil Servant system would vastly improve the quality of the recruits for the Regular Army, would cost nothing at all, and might even result in a considerable annual saving to the public purse.

Captain H. M. Johnstone, R.E., ret.

Somerfield Lodge, Haddington, N.B.,
20th August, 1908.

NAVAL AND MILITARY CALENDAR.

SEPTEMBER, 1908.

1st (T.) The Secretary of State for India sanctioned the issue of a gratuity to the officers, N.C.O.'s and men engaged in the operations against the Mohmands.

2nd (W.) H.M.S. *Highflyer* arrived at Plymouth from East Indies.

6th (S.) The German Imperial Manœuvres commenced in Alsace-Lorraine.

7th (M.) H.M.S. *Astræa* paid off at Colombo from China Station.

7th (M.) 3rd Bn. Worcestershire Regiment left South Africa for England in the *Avondale Castle.*

8th (T.) H.M.S. *Astræa* recommissioned at Colombo.

10th (Th.) Launch of first-class Battle-ship *St. Vincent* at Portsmouth.

" " Launch of first-class Battle-ship *Minas Geraes* from the Elswick Yard for Brazilian Government.

" " 2nd Bn. Norfolk Regiment left South Africa for Gibraltar in the *Galician.*

13th (S.) H.M.S. *Minerva* arrived at Sheerness from Mediterranean.

14th (M.) The Autumn Manœuvres on the South Downs commenced.

17th (Th.) 7th Dragoon Guards left England for Egypt in the *Dongola.*

18th (F.) H.M.S. *Highflyer* paid off at Devonport.

19th (Sat.) The Autumn Manœuvres concluded.

21st (M.) H.M.S. *Minerva* paid off at Chatham.

22nd (T.) " " recommissioned for further service in Mediterranean.

23rd (W.) H.M.S. *Cadmus* paid off at Hong-Kong.

24th (Th.) " " recommissioned at Hong-Kong.

27th (S.) 7th Dragoon Guards arrived in Egypt from England in the *Dongola.*

30th (W.) Launch of first-class Battle-ship *Erzherzog Franz Ferdinand* from the yard of the Stabilimento Tecnico, Triestino, Trieste, for the Austro-Hungarian Navy.

30th (W.) 3rd Bn. Worcestershire Regiment arrived in England from South Africa in the *Avondale Castle.*

FOREIGN PERIODICALS.

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NOTICES OF BOOKS.

The Naval Annual, 1908. Edited by T. A. BRASSEY, A.I.N.A. Portsmouth: Griffin & Co. 1908.

This year's issue of the "Naval Annual" fully maintains the high standard of excellence for which we are accustomed to look in this well-known work of reference.

In his preface the Editor warns us that one of the chief features in the present number of the Annual is the uncertainty of the particulars given regarding many ships under construction, and he criticises unfavourably the present practice of the Admiralty in withholding information regarding new ships, which was formerly published in the Naval Estimates a reticence which is now followed by other countries—

> "Since," he maintains, "it is impossible to preserve secrecy in these matters, and it is certain that, whether through the agency of secret services or by other means, information as regards new designs is placed in the hands of all those from whom there would be an advantage in concealing it, while the Parliament and taxpayers, who have to provide the money, are kept in ignorance."

Lord Brassey contributes a brief but suggestive introduction, in which he advocates—and here many naval officers will agree with him—that at least four more *Lord Nelsons* in view of the success of this type, that they are superior in protection to the *Dreadnought* and carry an effective secondary armament, should be built so as to form an homogeneous group of these powerful ships; he also advocates the construction of a special type of battle-ship for service in narrow and shallow waters, in view of the great draught of the latest ships, and further that all cruisers should be armoured—an opinion which will not meet with such ready acceptance, except by a certain school of naval thought.

The first three chapters, devoted to our own and foreign navies, and "Comparative Strength," accompanied by tables, are contributed as usual

by the Editor, with some assistance from Mr. John Leyland, and do not call for comment. Mr. Brassey, however, points out that as regards modern battle-ships we have only 41 as compared with a total of 38 for Germany and the United States—so that we are only just over the two-Power standard—and that we have only six battle-ships building, while Germany and France have each the same number, and the United States five ships under construction. He shows that after 1910 our relative position will rapidly deteriorate, unless more battle-ships are laid down at no distant date. In 1911, apart from ships not yet projected, only one battle-ship will be completed for the British Navy, as against two for the United States, three for Germany, and four for France. At the end of that year we shall only have 51 battle-ships, as against 52 for Germany and the United States. A considerable addition to our programme of battle-ship construction is required next year. Battle-ships laid down after 31st March, 1909, could be completed before the end of 1911. In armoured cruisers, Mr. Brassey considers we have an overwhelming superiority, but not greater than is required for the adequate protection of our interests; in protected cruisers of the second or third classes, we have a still large superiority, although 14 have been scrapped since last year, thus greatly lessening that superiority, while others, such as the *St. George*, *Bonaventure*, and *Thetis*, have been, or are being, converted into depôt-ships for submarines or destroyers, or into mine-laying vessels, still further reducing the number of cruisers available for the protection of commerce; and he points out that the modern third-class cruisers of the *Boadicea* or German types, although they could run away from, yet could not fight, the cruisers which have been, or which are now being, removed from the list.

Mr. Leyland gives a useful, though not very detailed, account of some of the "foreign manœuvres," while our own, having been conducted in profound secrecy, and no official comments on them having been published, have perforce been omitted. In describing the French Manœuvres, he describes the exhaustive trials to which the so-called Fournier tactics —of which some diagrams are given—were subjected in the Mediterranean, with the result that when practically tested the whole system seems to have hopelessly broken down. Mr. Leyland also contributes an interesting chapter (Chapter VII.) on the "*Personnel* of the French Navy."

In Chapter V. an anonymous but expert writer deals with the armoured cruiser question. He evidently belongs to the school of thought of which that well-known writer "Barfleur" is so able an exponent, and believes that the explanation of the characteristics of recent armoured cruisers is to be found in the tendency, attributed in many quarters to those at present in high authority at the Admiralty, to unduly magnify the importance of "war material, in spite of the fact that it remains inert till made operative by human will," and he pertinently asks:

> "How is she to be employed in war? The contention that in the defence and attack of ocean commerce, she would prove so formidable that her construction has rendered all smaller cruisers useless, appears to have been abandoned. . . . Commerce-destroying, it is assumed, will not be practised, because of its inutility as a belligerent operation, and because it can be prohibited by international agreement . . . . . but if we were to accept the opinion that commerce-destroying and, as a consequence, commerce-defence will have no place in future maritime wars, we should still have to determine the question: Of what belligerent utility is the armoured cruiser likely to be?"

And he holds that the more the armoured cruiser question is examined, the more difficult it becomes to fix the *rôle* which she could best play in war. The chapter is ably written, and the writer evidently holds views diametrically opposed to those of Lord Brassey on this question

The subject of engineering, the Editor informs us in his preface, which has not been reviewed since the untimely death of Mr. Dunell, is dealt with by Mr. Richardson in Chapter VI., who in an eminently readable fashion gives us the recent progress made with marine turbines.

In Chapter VIII., Sir Frederick Pollock deals with "The Second Peace Conference and Naval Interests," of which he gives an interesting *resumé*, the most striking features of which are, perhaps, the parts relating to "Maritime Capture," "Contraband of War," "The Rights of Neutrals," and "Submarines and Floating Mines." With regard to the last named, it is common property that the Convention as passed by the Conference was, in spite of all the efforts of the English Representatives, unsatisfactory in the extreme, Sir Ernest Satow formally declaring, on the part of England, that it could only be accepted as an instalment, and he pronounced it insufficient from the point of view both of neutrals' rights and of humanity.

> "Neutrals," Sir Frederick points out, "have a better title to claim, that their traffic on the high seas shall not be made dangerous long after actual hostilities on the spot have ceased, than belligerents have to appropriate the sea to their warlike purposes,"

and he fears that there is a growing disposition—which is by no means confined to great military powers—to favour belligerent convenience at the expense of neutral rights. In conclusion, he remarks that

> "War, nevertheless, does tend to become less probable. There has now been unbroken peace in Western and Central Europe for more than a generation, in spite of disputes and ambitions which, under the conditions of the 18th or early 19th century, would have been amply capable of producing a general European war."

Another interesting chapter is that by Admiral Sir Cyprian Bridge on "The Share of the Fleet in the Defence of the Empire." The author briefly and lucidly discusses the question of what "Command of the Sea" means, and incidentally points out the drawbacks to the creation of local defence forces, such as are desired by the Commonwealth of Australia, for instance.

> "Localised defence," he lays down, "is a near relation of passive defence. It owes its origin to the same sentiment, viz., a belief in the efficiency of staying where you are instead of carrying the war into the enemy's country."

And that he clearly shows is not the best way in which a colony may take its share of the naval defence of the Empire. Nor does the Admiral altogether approve of monetary contributions from the Colonies towards the maintenance of the fleet. In his opinion the best way in which the Colonies can take an effective share in the naval defence of the Empire is by their taking over the defence of the necessary naval bases which lie within their boundaries, making them secure against raids from an enemy, and keeping them in a state of efficiency for making good repairs to ships and the replenishment of supplies.

> "If all these," he continues, "are not provided by the part of the Empire in which the necessary naval bases lie, they will have to be provided by the Mother Country. If the former provides them, the latter will be spared the expense of doing so, and spared expense with no loss of dignity, and with far less risk of friction and inconvenience than if her taxpayers' pockets had been nominally spared to the extent of a trifling and reluctantly paid money contribution."

Part II. of the Annual consists of the usual lists and plans of ships of our own and foreign navies, while Part III. is again devoted to "Armour

and Ordnance"—a subject which circumstances compelled the Editor last year reluctantly to omit. It has this year been compiled by Commander Robinson, who, although not a gunnery officer, has succeeded in putting together, under somewhat difficult conditions, an interesting summary of the progress recently made in the manufacture of ordnance, armour plates, projectiles, etc., while he further gives an informing survey of the resources of the private manufacturers of the country for the supply of warlike material.

Part IV. is devoted, as usual, to the First Lord's Memorandum, British and Foreign Navy Estimates, and concludes with Sir Edward Grey's instructions for the Hague Conference, together with Sir Edward Fry's Report.

The Military Memoirs of Lieut.-General Sir Joseph Thackwell, G.C.B., K.H., arranged from diaries and correspondence. By Colonel H. C. Wylly, C.B., author of "The Campaign of Magenta and Solferino." John Murray: Albemarle Street, W. (Illustrated.)

The career of a soldier which began in the stormy days of the Irish Rebellion, which included the Peninsular, Waterloo, Afghanistan, and the conquest of the Punjab, cannot fail to be of stirring interest to every reader of military history. These memoirs give, in a marvellously concise manner, the story of Sir Joseph Thackwell's long and varied services. He served with the 15th Hussars during Sir John Moore's immortal march against Napoleon's communications in Spain, the sharp fight at Sahagun, and the retreat to Corunna. The year 1813 again saw him in the field with his regiment. At the decisive victory of Vittoria, the 15th Hussars were hotly engaged, and the Hussar brigade took a distinguished part in the invasion of Southern France. At Waterloo the regiment executed repeated charges to relieve the British squares from the pressure of the French cavalry attacks, and at the close of the day, when his seniors had been struck down, Captain Thackwell led the charge of the 15th against the retiring mass of the Imperial Guard. His left arm was shattered by a musket ball, and he lay on the field all night. Next day he was found, and his arm was amputated just below the shoulder; but he recovered so quickly from the shock that he was able to shave himself on the 22nd June, and was out walking on the 28th. Assuredly, the heroes of those days possessed a nervous system which most of us must envy.

From 1815 to 1837 were years of peace, but Thackwell utilised them to acquire all the theory and practice of leading cavalry which was within his reach. In 1825 he attended manœuvres, both in Prussia and Russia—a far more arduous performance than attending foreign manœuvres in these days, for the long journey across the Continent had to be performed in post-wagon. In 1837 our hero sailed for India, having exchanged as Colonel to the 3rd Light Dragoons (now Hussars). His Indian career embraced the first invasion of Afghanistan, the subjugation of Gwalior at the battle of Maharajpore, where he led the cavalry division, and the Sikh wars of 1846 and 1849. It is not possible to have chosen a period more full of critical events than the years which saw these important campaigns, and it is remarkable how little attention they have received from military students. The appendices contain the principal

despatches, which describe the operations of the army of the Indus in Afghanistan, the Gwalior campaign, and the battles of Sobraon, Chillianwallah, and Goojerat. These despatches are important historical documents, and the fights which they describe are especially interesting for the brilliant part played by the cavalry division under Sir Joseph Thackwell, which was hotly engaged in each. At Sobraon the 3rd Light Dragoons were led by the General in single file across a dam into the Sikh entrenchments, where they formed line and repeatedly attacked the enemy's flank. At Chillianwallah and Goojerat, as well as at Aliwal in 1846, the cavalry charged home, and at the cost of heavy losses triumphed by shock action.

During the intervals of peace it is recorded that Sir Joseph was an unusually energetic and conscientious chief, who exerted himself outside the routine demands of the service, to maintain and improve the fighting capacity of his troops. As Colonel Wylly points out, he received less than his due mead of official recognition, even after allowing for the fact that rewards and praise were not showered upon senior officers with impolitic profusion in those days. It would almost seem, from the correspondence which passed between him and the Commander-in-Chief, relative to certain despatches, that a jealousy of the cavalry arm, and, perhaps, of its commander, somewhat obscured the judgment of Lord Gough in awarding credit after the battle of Sobraon. Certainly no one realised how important the *rôle* of the cavalry was in these engagements, nor did the Commander-in-Chief understand how to make the best use of his cavalry division as a "mass of manœuvre." His idea was that the cavalry should protect the flanks of the attacking infantry, which it very effectually did by attacking in its turn, and by energetic pursuit when success was achieved. These despatches are worth studying, for they throw a light on the development of the practice of praising all the officers in immediate contact with the generals, while the good work of subordinates has too often been taken for granted. Lord Gough's letters, some of which are quoted, are also written in extremely quaint style, with many pious ejaculations, and appeals to the Almighty. His capacity as a commanding general can be gauged from this letter written to Thackwell while in pursuit of the Sikhs after the action of Sadoolapore :—

"Ramnuggar,

"2 a.m., *4th December.*

"My Dear Thackwell,—Not having heard from you I hardly know what to say. I hope Brigadier Godly has joined you with reinforcements, both with cavalry and guns, but this fearful river and want of boats embarrass us much. Pray communicate with me by an officer, who can cross at our pontoon bridge, which I will ride over to this morning if I can be spared here. I should like to see Nicholson at it, at this side, with some intelligent officer from you—say at 7 o'clock—that is, if the enemy have not retired during the night.

"Sincerely yours,

"Gough.

"I hope you have got your ammunition. What is the enemy's position—how far from you?"

Chapters XIV. and XV. discuss the early events of the second Sikh war, and describe the concentration of the opposing armies on the banks of the Chenab. Gough wished to drive the enemy from his entrenched position on the right bank, which barred the advance of the British, and which seemed to menace Lahore. Judging a direct attack to be hazardous, Gough detached 7,000 men under Thackwell to cross higher up at one of three fords, which were indicated, and to turn the hostile flank. Slovenly staff work at headquarters delayed the march of the detachment, which crossed at the most northerly of the three fords, and which was immediately opposed by the main body of the Sikh forces, while a weak detachment kept Gough amused at Ramnuggar. Thackwell's position was critical, for no measures had been taken to ensure concerted action between the detached wing and Gough's main body. A spirited action followed, in which Thackwell remained on the defensive, covering the ford by which he had effected his passage. This was followed by the retreat of the Sikhs to the banks of the Jhelam. In his despatches the Commander-in-Chief referred in terms which implied blame to his lieutenant, for the choice he made of the three fords, and for having failed to bring the Sikhs to a general action, in which the British main body might have joined with decisive effect. A careful study of the orders issued to the detachment, and of the conditions of time and space show that Thackwell acquitted himself well in effecting the passage without loss, and that the inaction of the main body enabled the Sikhs to turn in such force upon him that a defensive action was prudent and necessary. Lord Gough's despatch was written without waiting for Sir J. Thackwell's report, and without comparison with any copy of the instructions issued to him, for no copy had been made. The whole narrative of the passage of the Chenab, and the proceedings of the Commanding General and his staff officers, afford very interesting matter for reading and reflection.

Want of precision in staff work and in the composition of orders will always mar the work of an army, whose leaders and staff officers have not acquired the practice of writing terse and simple instructions and reports. In spite of the elaborate and costly steps taken, and money spent for the education of our staff, recent events have given fresh proof of the importance of the question. The troops who fought at Aliwal and Sobraon, at Chillianwallah and Goojerat, displayed the highest courage, tenacity, and discipline. When such qualities are found in the rank and file of an army, it can be taken for certain that the leaders are men of honour, more devoted to the welfare of their service than kee for individual advancement, because the ranks always reflect the character of their immediate chiefs, and example is incomparably more powerful than anything else in extracting the best efforts of the soldier. No blight can be more mischievous to the efficiency of an army than a spirit of disloyalty and self-seeking in the officer corps. When such faults are common among leaders, and they are opposed by troops whose commanders can be counted on loyally to support one another, no valour or devotion of the rank and file can, as a rule, stave off disaster. History has given repeated examples of the fact.

It is, perhaps, as a study of character that the life of Sir Joseph Thackwell especially merits our consideration. In subordinate rank he succeeded in giving satisfaction; as commander of two regiments in

succession, the 15th and 3rd Hussars, he held the respect and affection of his officers and men, although he made greater demands on them in the way of military application than some of his contemporaries. As a general and inspecting officer, he never shirked his duty in peace, while he added to his renown as an enterprising and intelligent cavalry chief in each of his campaigns. His life will be read with keen interest and, perhaps, with envy, by a generation which has lived in a less glorious epoch.

We congratulate Colonel Wylly on the excellent treatment of a fascinating subject, and our only complaint is that he has not been able to deal at greater length with the personal experiences of his hero, embracing as they do a share in some of the most dazzling victories achieved by the British Army.

A Military History of Perthshire, 1660-1902. Edited by the Marchioness of TULLIBARDINE. Perth: R. A. and J. Hay; London: Hugh Rees, Ltd., 119, Pall Mall, S.W. Price, £1 11s. 6d.

The Editress is to be congratulated on the excellence of her work, which contains a mass of most useful and interesting information. The book is divided into two volumes (very handsomely illustrated), the first one being a record of the services rendered to the Empire by Perthshire men and Perthshire Regiments since the inauguration of the Standing Army in the year 1660 up to modern times; while the second volume deals more especially with the doings of the Perthshire Regiments during the late war in South Africa, and concludes with a roll of the Perthshire men of the present day, who have seen active service under the British flag.

With regard to the first volume (which can be obtained separately at a cost of one guinea), owing to the narrative not being continuous, the articles being contributed by various writers, the book can be taken up at the reader's leisure, and one or two chapters from any part of the book can be read without in any way interfering with the general sequence, for the articles have been grouped in sections according to the subject. Amongst the more prominent contributors are: Mr. Andrew Ross, *Ross Herald*, who writes on the early regiments of the County; Mr. Allan McAulay, who gives a history of the first Battalion of the Black Watch, from 1725 to 1901; and the Duke of Atholl, who records the doings of the Atholl Highlanders. Mr. Walter Biggar-Blaikie gives the records of the second Battalion of the Black Watch, and Sir James Ramsay, of Bamff, and Colonel D. M. Smythe, of Methven, also contribute articles.

Lady Tullibardine has herself contributed some twenty-nine chapters, and some of them stand out prominently as the chief features of the work. Three articles are devoted to battles which have taken place in Perthshire, two of these, those describing the Battles of Killiecrankie and Sheriffmuir, have been written in a most delightful way; the third, which deals with the early Perthshire battles, and includes a note on the Sieges of Perth, comes from the pen of Sir Alexander Muir Mackenzie, of Delvine.

Forty-seven biographies of Perthshire men of action are given, the more prominent of them being:—Montrose, Admiral Viscount Duncan, General Sir Thomas Stirling, Rear-Admiral Sir John Lindsay, Admiral Viscount Keith, General Lord Lynedoch, General Sir David Baird, General

Sir George Murray, Admiral Sir Alexander Cochrane, Rear-Admiral the Earl of Dundonald, Lieut.-General Sir Archibald Campbell, General Sir Gordon Drummond, General Sir James Hope Grant, Admiral Sir James Robert Drummond, and General Sir Thomas Steele of Evelick.

Lady Tullibardine's efforts will certainly be rewarded by the general interest which will be taken in the work; the book will appeal not only to Perthshire men, but to all who have a taste for history.

PRINCIPAL ADDITIONS TO LIBRARY DURING AUGUST AND SEPTEMBER, 1908.

Military Hygiene—A Manual of Sanitation for Soldiers. By Lieut.-Colonel R. H. FIRTH. Crown 8vo. 3s. 6d. (Presented.) (J. & A. Churchill.) London, 1908.

The Sword and how to Use it. By Lieut. J. BETTS. Crown 8vo. 2s. (Presented.) (Gale & Polden, Ltd.) Aldershot, 1908.

The Brave Sons of Skye. By Lieut.-Colonel JOHN MACINNES, V.D. 8vo. (Presented.) (Eyre & Spottiswoode.) London, 1899.

Field Service Manual. Native Silladar Cavalry. (Provisional Edition.) 8vo. (Presented.) Calcutta, 1908.

Field Service Manual. Veterinary. 8vo. (Presented.) Calcutta, 1908.

Field Service Manual. Telegraphs. 8vo. (Presented.) Calcutta, 1908.

Memoirs and Services of the Eighty-Third Regiment, County of Dublin, from 1793 to 1907. 8vo. 3s. (Presented.) (Hugh Rees, Ltd.) London, 1908.

Washed by Four Seas. By H. C. WOODS. 8vo. 7s. 6d. (Presented) (T. Fisher Unwin.) London, 1908.

A Series of Views in Turkey and the Crimea, from the Embarkation at Gallipoli to the Fall of Sebastopol. By Lieut.-Colonel ANDREWS, late 28th Regiment. Royal Folio. (Presented.) London, 1856.

Historical Notes on the Services of the Irish Officers in the French Army—Addressed to the National Assembly by one of its Members, General Arthur Dillon, 1762. Translated from the French by J. P. LEONARD. 12mo. Dublin, n.d.

Field Artillery Training, 1908. 12mo. 1s. (Presented.) (Harrison & Sons.) London, 1908.

Grant and Lee in Virginia, May and June, 1864. By Lieut.-Colonel H. M. E. BRUNKER. Crown 8vo. 3s. (Presented.) (Forster, Groom & Co., Ltd.) London, 1908.

Sketch Map to Illustrate the Virginian Campaign. 8vo. 2s. 6d. (Presented.) (Forster, Groom & Co., Ltd.) London, 1908.

Admiralty Orders in Council. 9 vols. and 1 vol. Index. 8vo. (Presented.) London, 1856-1908.

Notes on Staff Rides and Regimental and Tactical Tours for Beginners. By Major T. E. FOWLE. New Edition. Crown 8vo. 2s. (Presented.) (Gale & Polden, Ltd.) London, 1908.

The Execution of Infantry Intrenchments. By Major H. JENNINGS-BRAMLY. Crown 8vo. 2s. (Presented.) (Hugh Rees, Ltd.) London, 1908.

The Russo-Japanese War: The Yalu. Prepared in the Historical Section of the German General Staff. Authorised translation by KARL VON DONAT. 8vo. 10s. 6d. (Presented.) (Hugh Rees, Ltd.) London, 1908.

Grant's Campaign in Virginia, May 1—June 30, 1864. By J. H. ANDERSON. 8vo. 3s. 6d. (Presented.) (Hugh Rees, Ltd.) London, 1908.

Military Engineering (Part I.), Field Defences. 8vo. 1s. 6d. (Presented.) (Harrison & Sons.) London, 1908.

Manual of Physical Training. 8vo. 1s. (Presented.) (Harrison & Sons.) London, 1908.

Cyclist Training (Provisional). 12mo. 4d. (Presented.) (Harrison & Sons.) London, 1908.

A Mariner of England: An Account of the Career of William Richardson, from Cabin Boy in the Merchant Service to Warrant Officer in the Royal Navy (1780 to 1819), as told by Himself. By WILLIAM RICHARDSON. Edited by Colonel SPENCER CHILDERS. 8vo. 10s. 6d. (Presented.) (John Murray.) London, 1908.

German Regulations for Manœuvres, 1908. Translated by the General Staff, War Office. 12mo. 3d. (Presented.) (Harrison & Sons.) London, 1908.

Twentieth Century Impressions of British Malaga. Its History, People, Commerce, Industries, and Resources. Med. 4to. (Presented.) (Lloyd's Greater Britain Publishing Co., Ltd.) London, 1908.

Dumouriez and the Defence of England against Napoleon. By J. Holland Rose. 8vo. 21s. (John Lane.) London, 1909.

A Note on the Drawings in the Possession of the Earl of Dartmouth, illustrating the Battle of Sole Bay, May 28, 1672, and the Battle of the Texel, August 11, 1673. By Julian S. Corbett. 8vo. London, 1908.
Drawings to ditto. Folio. London, 1908.

The Military Memoirs of Lieut.-General Sir Joseph Thackwell, G.C.B., K.H., Colonel 16th Lancers. By Colonel H. C. Wylly. Arranged from Diaries and Correspondence. 8vo. 15s. (Presented.) (John Murray.) London, 1908.

Field Service Manual, 1908: Infantry Battalions. 8vo. 3d. (Presented.) (Harrison & Sons.) London, 1908.

Catalogue of the Library. Royal Statistical Society. 8vo. 10s. 6d. (Presented.) London, 1908.

War Establishments for 1908-1909. Crown 8vo. 8d. (Presented.) (Harrison & Sons.) London, 1908.

The Army Annual, 1908. Edited by Major B. F. S. Baden-Powell. 8vo. 7s. 6d. (Presented.) (The Army Press.) London, 1908.

The Historical Records of the Fifth (Royal Irish) Lancers. Med. 4to. 42s. (Presented.) (Arthur Doubleday & Co., Ltd.) London, 1908.

The New State of England. Crown 8vo. (Presented.) London, *circa* 1693.

Instruktion zum Reit-Unterricht für die Kavallerie, vom 31 August, 1882. Crown 8vo. (Presented.) Berlin, 1882.

Notes on Field Artillery for Officers of all Arms. By Captain O. L. Spaulding, U.S.A. Crown 8vo. (Presented.) (U.S. Cavalry Association.) Kansas, 1908.

Commentaires de Cesar, avec des Notes historiques critiques et Militaires, par M. le Comte Turpin de Crissé." Nouvelle Edition. 3 Vols 8vo. Amsterdam, 1787.

Military History for Examinations, November, 1908, and May, 1909: Questions on Grant's Operations in Virginia, from 3rd May to 30th June, 1864. By Lieut.-Colonel H. M. E. BRUNKER. Crown 8vo. 1s. (Presented.) (Forster, Groom & Co., Ltd.) London, 1908.

The Military Law Examiner. By Lieut.-Colonel S. C. PRATT. 7th Edition. Crown 8vo. 4s. 6d. (Presented.) (Gale & Polden, Ltd.) Aldershot, 1908.

Military Law made Easy. By Lieut.-Colonel S. T. BANNING. 4th Edition. Revised by Captain R. F. LEGGE. Crown 8vo. 4s. 6d. (Presented.) (Gale & Polden.) Aldershot, 1908.

Royal Army Medical Corps Training. Crown 8vo. 9d. (Presented.) (Harrison & Sons.) London, 1908.

Technical Instructions for the Use of Telephones in the Field (Provisional). Pamphlet. 12mo. 2d. (Presented.) (Harrison & Sons.) London, 1908.

RECENT PUBLICATIONS OF MILITARY INTEREST.

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PREFATORY NOTE.

This Pamphlet will be issued quarterly, in April, July, October and January. Its purpose is to draw the attention of Officers to British and Foreign publications of Military interest which are likely to assist them in their professional work. Copies of the pamphlet will be distributed to the Headquarters of Commands, Educational Establishments, Units and Reference Libraries.

PART I.

BOOKS.

NOTE.—1. *When the price is not given in Part I., it is not known.*
2. *In Part I., books whose titles are given in foreign languages, as well as in English, are published in those languages, and are not translated.*

HISTORICAL.

Dupleix and the Defence of Pondicherry (1748) (Dupleix et la défense de Pondichéry (1748)). By Marquis de Nazelle. 470 pp. 8vo. Paris, 1908. Librairie Honoré Champion, 5 Quai Malaquais. 6/8.

This work, compiled to a great extent from hitherto unpublished documents, and from the archives of the Dupleix family, gives us a clear picture of the energy and ability of our great opponent in India, showing the difficulties with which he had to deal and the apathy of the French Government at that time. In the middle of the 18th century, of course, the struggle between French and English in India was in full swing, and victory seemed likely to incline to the side of our opponents.

The Seven Years' War; a Diplomatic and Military History. Volumes II., III., and IV. (La guerre de sept ans; histoire diplomatique et militaire. Tomes II., III., et IV.). By M. Richard Waddington. Volume II., 500 pp., with 7 maps. Volume III., 550 pp., with 6 maps. Volume IV., 640 pp., with 8 maps. 8vo. Paris, 1908. Firmin-Didot. 6/- per volume.

This is an admirable history of an interesting and engrossing war, which owes its great hold on our imagination to the brilliant exploits in which it abounds, as well as to the immense importance of the issues which were at stake. Simultaneously with the great war being waged in Central Europe, Great Britain and France were fighting for the sovereignty of two vast continents, India and North America. The prize of the struggle was a great Colonial Empire, which fell to the lot of Great Britain, whose success was, as Englishmen believe, in a very considerable measure, due to the genius of one man, William Pitt.

M. Waddington does not altogether agree with this opinion. He considers it difficult for a foreigner to understand Pitt's extraordinary renown, which existed during his lifetime, and has not been dimmed in the course of a century and a half. Whilst acknowledging that he was gifted with foresight, clearness of vision, and firmness, M. Waddington goes on to enumerate various defects in his character, which appear to deprive him of the right to lay claim to a place among the great statesmen of history. M. Waddington, in fact, looks upon Pitt as a typical Englishman of the period, possessing indeed the virtues of his countrymen in a high degree, but also, to an equally great extent, their faults and shortcomings.

Bonaparte and the Consulate. By A. C. Thibaudeau. Translated and edited by G. K. Fortescue, LL.D. 314 pp. 8vo. London, 1908. Methuen. 10/6.

Thibaudeau's "Mémoires sur le Consulat," of which this is an excellent translation, has become so rare that this interesting work will be of special value to the student of Napoleon as a statesman. It gives a chronological table of events from November, 1799, to May, 1804, and deals fully with the period between February, 1800, when Bonaparte, as first Consul, took up his residence in the Tuileries, and 1804, when the Empire was founded.

The work consists largely of records of discussions in the Council of State, and of private conversations between the first Consul and various Councillors, all of which show clearly the foresight and genius of Napoleon in the compilation of the Code Napoleon and Consular Constitution. The Editor, in a preliminary note, gives a clear and full outline of the Constitution of 1799, and the ample notes throughout the book give useful and interesting information.

An index makes reference easy.

This work does not, however, contain much of interest to the student in search of military information alone.

Memoirs of the Wars of Napoleon, 1806-1813 (Mémoires sur les guerres de Napoléon, 1806-1813). By Gen. Désiré Chlapowski. Baron of the Empire (published by his sons). 370 pp. 8vo. Paris, 1908. Librairie Plon. 2/6.

Gen. Chlapowski was a Polish officer who served with considerable distinction under Napoleon, and became A.D.C. to the Emperor.

These memoirs acquire additional interest from the fact that the author was not a Frenchman, nor even very friendly to France; he served in the French army merely because he hoped that Napoleon would effect the liberation of Poland from foreign domination. When the Emperor showed his readiness to abandon the cause of Poland, Chlapowski at once sent in his resignation and left the army. The memoirs, though written by an officer of the French army, do not therefore show the extreme bias and partiality which so often detract from the value of such writings.

Memoirs of General Bennigsen. Volume III. (Mémoires du général Bennigsen, Tome III.). By Capt. E. Cazalas, French General Staff, under the auspices of the historical section of the French General Staff. 470 pp., with 4 maps. 8vo. Paris, 1908. Lavauzelle. 8/-.

The first two volumes of Gen. Bennigsen's memoirs, translated and published by Capt. Casalas, were highly appreciated. The value of the third volume is perhaps even greater, owing to the fact that it deals with the important campaigns of 1812 and 1813.

Gen. Bennigsen does not, in his letters, confine himself to a mere narrative of events; he indulges in frequent and able criticisms, and his remarks on the campaign of 1812 are of particular value and importance, as he does not spare either Napoleon, Alexander I., or the Russian leaders.

Among the appendices is an account of the assassination of the Czar Paul, and a biography of a number of Russian generals, containing most interesting details.

The maps accompanying the volume are good and accurate.

The Centenary of Saint-Cyr (1808-1908) (Le Centenaire de Saint-Cyr (1808-1908)). Committee of the centenary of Saint-Cyr. 220 pp., with numerous portraits and illustrations. 8vo. Paris, 1908. Berger-Levrault. 2/6.

An interesting review of the history of Saint-Cyr, with an account of the work accomplished by the school and its alumni.

The Leipzig Campaign, 1813. (Special Campaign Series.) By Col. F. N. Maude, C.B. 270 pp., with maps. 8vo. London, 1908. Swan Sonnenschein. 5/-.

This volume, which is No. 7 of the Special Campaign Series, opens with an account of the condition and evolution of the Prussian and French Armies respectively, in which Col. Maude traces the causes of the decline of the Prussian Army from the model of Frederick the Great. His chapter on the French Army is more a review of the Napoleonic methods than of the French Army as such.

Two chapters are then devoted to the prologue of the war and to the operations up to, and including, the battle of Lützen. The next chapter deals with the operations up to the armistice, including the battle of Bautzen. The author, in common with many authorities, blames Ney largely for the indecisive result of that battle.

The remainder of the book deals with the operations of the Autumn Campaign, culminatng in the battle of Leipzig.

The book is a strategical study only, for, within the limits of 270 pages of tolerably large print, it would be impossible to deal with the tactical side of a campaign, which included so many engagements and battles.

Col. Maude's conclusions, and the arguments which lead to those conclusions, can by no means always be accepted, but if the reader is content to study the account of the operations and deduce therefrom his own lessons, then the book can be thoroughly recommended, for the account of the operations is clear and the maps fairly good, though a certain number of places mentioned in the narrative can not be found on them.

Col. Maude uses the book as a vehicle to expound some of his pet theories, especially those of psychic force and of will power, with which readers of *War and the World's Life* will be familiar.

The Campaign of 1815, Chiefly in Flanders. By Lieut.-Col. W. H. James. 331 pp., with maps. 8vo. London, 1908. Blackwood. 16/-.

Colonel James in the preface gives as the object of his book "to investigate these charges (*i.e.*, those made by German writers against the Duke and in depreciation of the part taken by the British troops) and to determine certain other questions, such as the reasons for the delay in issuing the orders for the concentration of the Anglo-Allied army, the instructions given by Napoleon to Ney on the 15th June, the cause of the Prussian hesitation on the 18th, and the formation of the Imperial Guard in its last attack."

Regarding the first point, Col. James blames the Prussians and especially Gneisenau, for failing to give Wellington any information as to the results of the French advance against them on the 15th. Wellington, we believe, did not blame anybody, but says "that there was certainly something out of order in the communication between the two armies in the middle of June." Col. James also blames Dörnberg, but praises Constant and Perponcher for their action.

Col. James also blames Gneisenau for the events of the 16th. It is stated that Gneisenau selected the ground for the battle of Ligny himself, and that consequently he is to blame for the Prussian defeat; also that it was owing to bad staff arrangements that Bülow did not reach the battle-field.

Gneisenau again is called to task for the staff arrangements on the 18th, when the author considers that he committed an error in sending Bülow to lead the advance against the French right flank, and also in the general arrangements for the marches of the various corps. Col. James is convinced that Blücher, thoroughly loyal to the Duke, was ignorant of the details of the arrangements made by the chief of his staff.

The account of Waterloo itself is very clear, and the comments and arguments at the end of the account are worth reading. In these Col. James blames Napoleon and Ney for their inactivity on the 17th, and Napoleon for not using his cavalry sufficiently, while he comments on the bad staff arrangements of all three armies.

Generally the book has much to recommend it. It is written in a clear, straightforward style, and the operations can therefore be easily understood. It cannot be said that Col. James brings out very much new about a campaign respecting which so much has already been written, but he would seem to have attained the object set forth in his preface. The maps are excellent. It is to be wished that the price had not been so excessive.

The Revolt in Hindustan, 1857-59. By Field-Marshal Sir Evelyn Wood, V.C., G.C.B., G.C.M.G. 356 pp., with maps. 8vo. London, 1908. Methuen. 6/-.

The bulk of the matter contained in this book has already been published in the form of articles in the *Times* in 1907. The Field-Marshal has now amplified the articles and made them into a short history of the principal events in India, 1857-59, and coming from the pen of so distinguished a soldier, the book will be read with interest by the army. The book is not confined to Sir E. Wood's own experiences, but describes the events of the mutiny all over India. The author appends a bibliography of the works which he has consulted.

The Canadian Militia, By Capt. E. J. Chambers. 125 pp., illustrated. 4to. Montreal, 1907. L. M. Fresco. 20/-.

The book traces the development of the military forces of Canada from their earliest days, and records the successive changes which have taken place from time to time in their organisation and administration, at the same time the different campaigns in which the forces have taken part are briefly referred to. The author commences by describing the Militia system under the French régime, and then goes on to show how it was reconstituted under British rule, which dates from the capitulation of Montreal in September, 1760. The various changes in the constitution and organisation of the Militia in the succeeding years are then recorded, and it is shown how the confederation of the different provinces, the grant of self-government, the Trent affair, and the part taken in different campaigns have gradually raised the Canadian forces from the level of a mere auxiliary to the Regular Army to the status of a powerful unit of the Imperial forces. The book concludes by giving a short account of recent developments in the Canadian Militia, and a brief description of the Department of Public Works, in so far as it is responsible for the provision of magazines, armouries, &c., for the military forces.

The First English Conquest of Canada. By Henry Kirke, M.A., B.C.L., F.R.G.S. 224 pp., illustrated. 8vo. 2nd edition. London, 1908. Sampson Low, Marston. 3/6.

The author commences with an account of the causes which led up to the war with France of 1626-29, and then goes on to describe the growth of the commercial spirit in England, and the various expeditions to North America by merchant adventurers. The capture of Quebec by Sir David Kirke and his brothers in 1629, as well as the circumstances under which it was handed back to the French in 1632, is then recorded. The author at this point describes the discovery of Newfoundland, and the various attempts to establish a settlement there. He concludes with a short account of the first settlement in Nova Scotia, and shows how the interests of the early settlers were entirely ignored in the treaties contracted between England and France.

The Wilderness, Spotsylvania and Col Harbor. From Battles and Leaders of the Civil War. 150 pp., with many illustrations and sketch maps. 8vo. London, 1908. Rees. 7/6.

This is a reprint of that part of Battles and Leaders which deals with Grant's Campaign in Virginia in 1864. It is unnecessary to recommend this book, which is already well known, to all students of military history. It is a pity that in a book of this sort that the maps should be so indifferent.

History of the War of 1870-71. Volume VII. The Capitulation of Metz, 19th August—29th October, 1870. (Histoire de la guerre de 1870-71. Tome VII. La Capitulation de Metz, 19 Août—29 Octobre, 1870.) By Pierre Lehautcourt. 584 pp., with 4 maps. 8vo. Paris, 1908. Berger-Levrault. 5/-. (For Vol. VI. *see* p. 148 of January JOURNAL.)

This is the last volume of the series dealing with the early part of the Franco-German War, and is fully up to the high standard set by the other works. The author gives us a complete account of the military operations which occurred during the siege, and points out clearly and ably the various lessons to be learned from them; he also examines very closely the conduct of Marshal Bazaine, his character, mentality, and the reasons which guided his conduct.

The book is well worth reading, and is a most valuable addition to the existing literature on the war of 1870-71.

The War of 1870-1871. General Bourbaki's Campaign in the East of France. (1st Volume.) (La guerre de 1870-71. Etude sur la campagne du Général Bourbaki dans l'Est. (Tome I.)) By E. D. 460 pp., with maps. 8vo. Paris, 1908. Chapelot. 8/6.

This volume deals with the operations of Gen. Bourbaki and his German opponents from December 19th, 1870, to January 1st, 1871; each day's movements are described at length, and complete details are given, showing careful and thorough research on the part of the author.

Our Troops in Bosnia and Herzegovina in 1878. Volume III. In Herzegovina. Volume IV. Banjaluka-Jajce. (Unsere Truppen in Bosnien und der Herzegovina 1878.) Vol. III. By Lieut.-Gen. Emil von Woinovich. 96 pp. Vol. IV. By Capt. Joseph Beck. 152 pp. Illustrated. 8vo. Vienna, 1908. C. W. Stern. Vol. III. 1/9. Vol. IV. 3/-.

These volumes contain an account of the Austro-Hungarian operations in Bosnia and Herzegovina in the year 1878.

Report of the Santiago Campaign, 1898. By Lieut.-Colonel A. L. Wagner, U.S. Army. 155 pp., with 3 sketch-maps. 8vo. Kansas City, 1908. Franklin Hudson Publishing Co. 4/5.

An official report on the operations in Cuba from the mobilisation at Tampa to the fall of Santiago. The late Lieut.-Col. Wagner, a military writer of some reputation, was entrusted with the organisation of a Field Intelligence Department, but, on his arrival in Cuba, found this duty in other hands, and thereforth served as a volunteer on the staff of Gen. Lawton's Division. The little volume contains much outspoken and sometimes useful criticism, and should be read as an appendix to Capt. Sargent's longer and more detailed account, which was noted in the January, 1908, number of "Recent Publications."

Monographs in Military History (Kriegsgeschichtliche Einzelschriften). Issued by the Historical Section of the Great General Staff. Series 41/42. Experiences of Modern Wars outside Europe. The Russo-Japanese War, 1904-5. Wa-fang-kou and preliminaries to Liao-yang. With 5 panorama sketches and 2 appendices; 11 lithographed maps in separate case. 8vo. Berlin, 1908. Mittler. 5/2 with maps.

This is the third series of monographs on the Manchurian War issued by the Great General Staff in Berlin.

The first section deals with the movements of the opposing forces in June, 1904, and contains descriptions of the battle of Wa-fang-kou and the action of Hsiu-yen (German rendering is Siu-yang).

The second section deals with the operations of the IInd and IVth Armies up to the end of July, 1904.

The third section treats of the events in the eastern portion of the theatre of war up to the beginning of August, 1904.

Section IV. contains a brief survey of the situation at the commencement of the fighting round Liao-yang.

Section V. deals with the fighting on the east of Liao-yang, August 26th to 28th.

Section VI. deals with the operations on the south side during the same period.

The narrative throughout is most clear, and the maps are excellent. English students will, however, be puzzled by the different transliterations. The use of maps issued with reports of British attachés will consequently be found of great assistance.

The comments of the German General Staff on the operations under review are as follows:—

The Russians during the period succeeding the fighting at the Yalu and at Nanshan were reaping the fruits of their previous omissions. They had neglected to oppose the Japanese landings, had faced Kuroki with insufficient forces, and had allowed Port Arthur to be cut off. The necessity of attempting to raise the siege of this fortress from the land side placed them in a difficult position. Every advance southward from Ta-shih-chiao exposed their communications to interruption by Kuroki or by further Japanese landings on the shores of Liao-tung, thus proving the influence that sea-power exercises on military operations near a coast line. As things stood, Kuroki must be crushed before Stakelberg's southward move could have any decisive result. An offensive movement eastward had, at that time, every prospect of success. In hill warfare the offensive has many advantages, as was shown by the advance of the 1st Japanese Army in July and August. The Russian forces available in May were, however, somewhat inadequate for such an enterprise. In the absence of a move against Kuroki, Stakelberg's advance must either be a half measure or if made in strength a great piece of temerity.

The operations under consideration illustrate the dependence of strategy upon the configuration of the theatre of operations. Acting on interior lines according to approved principles was impossible for the Russians, whose rear was never free. The above must be taken into account in order rightly to appreciate the Russian conduct of the war.

Nevertheless, the movement on Wa-fang-kou had some prospect of success. Approximately equal forces contended for victory which for some time hung in

the balance. Better tactical training on the Russian side and the timely arrival of the fresh troops *en route* might have given them the victory. Stakelberg was justified in waiting for reinforcements before pushing forward but the disastrous effect of the half measures which Kuropatkin and his subordinates favoured, is clearly demonstrated.

The Russians covered their retreats with praiseworthy skill, and the practicability of such operations in present-day warfare as demonstrated in this campaign deserves to be noted. Adopted by them with a purely defensive purpose, manœuvres of this nature may become necessary even though an offensive strategy be contemplated.

If Kuropatkin's intention was not to accept a serious battle except at Liao-yang, maintenance of touch with the enemy on both fronts (south and east) was imperative, and such touch could only be maintained by some offensive movements in the mountainous eastern region. No necessity existed, however, for exposing the advanced detachments to defeat in detail in prepared positions. The independent larger cavalry units, reinforced by cavalry with army corps and by some of the numerous (regimental) mounted scout detachments, should have formed the foremost line, supported by infantry bodies thrown forward.

The attraction of the prepared position of Liao-yang appears to have dominated the strategy of the Russian generalissimo. In August several opportunities for successful strokes—especially against Kuroki—presented themselves.

The exaggerated idea of the Japanese strength which prevailed at Russian headquarters, which had its origin in the division of the Japanese forces into "armies," had some influence on Kuropatkin's attitude.

The Japanese had to secure what was already gained. Safe bases on the Manchurian mainland were indispensable and considerations of foreign loans imposed additional caution. Moreover, the rains, which principally affected offensive operations, greatly retarded their movements.

The IInd and IVth Armies showed more energy than did the Ist Army. Transport and supply difficulties delayed the mobilisation of the active troops remaining in Japan, and as the passive attitude of the Russians could not be foreseen, the Japanese position during this period was actually one of great risk.

Monographs in Military History (Kriegsgeschichtliche Einzelschriften) Issued by the Historical Section of the Great General Staff. Series 43/44. Experiences of Modern Wars outside Europe. The Russo-Japanese War, 1904-05—Battle of Liao-yang. 127 pp., 10 appendices. Separate case containing 10 lithographed maps. 8vo. Berlin, 1908. Mittler. 4/6 with maps.

This work is divided into six sections.

Section 1 deals with the preparations for the battle. The Russian position and the distribution of troops along it are described in detail. The Japanese dispositions are also given.

Section 2 deals with the fighting on the Russian right, August 30th-31st.

Section 3 deals with the fighting around the position Tsao-fan-tun (German rendering Zo-Fan-Tun), Ku-cheng-tzu (German rendering Kau-Tschin-Tsy) which was attacked by the Japanese Guard and 10th Divisions on August 30th-31st.

In Section 4 the fighting of the Ist Japanese Army on the right bank of the Tai-tzu-Ho on September 1st is described.

Section 5 deals with the Japanese attacks on the Liao-yang defences, September 1st-3rd.

The 6th Section is devoted to a description of the Russian retreat.

In conclusion, criticisms on the strategy and tactics of both sides are offered, the gist of which is as follows:—

The decision of Kuropatkin to accept battle was justified, but not so his dispositions. His position was liable to be turned on both flanks. Infinitely greater liberty of action would have been gained by transporting the extensive war material which was stored at Liao-yang to the north betimes, thus rendering the possession of Liao-yang city a matter of minor importance. Col. Gädke, the well-known war correspondent of the *Berliner Tageblatt*, disagrees with this criticism on the ground that the moral effect of abandoning a carefully prepared position without fighting would have been as bad as that of a lost battle. The authors proceed to point out that the holding of the Liao-yang position was an evil, in that it enabled the Japanese to concentrate their main forces against Liao-yang itself, leaving only detachments to watch the Tai-tzu-Ho, since a formidable counter-attack across that river was not to be apprehended. Such a movement was indeed impossible for the Russians; if made in considerable force below (west of) Liao-yang it exposed their army to disaster in case of failure; if made with small numbers it would have produced little effect. Upstream of Liao-yang great difficulties of ground presented themselves. Considering the above factors, it would have been better to concentrate the main force around Lotatai (some 8 miles N.E. of Liao-yang) in readiness to attack the enemy when he crossed the Tai-tzu. A measured resistance on this river would have exhausted the assailants prematurely. Here, again, Col. Gädke joins issue with the Great General Staff. The cautious Japanese, says he, would in such a case have merely pushed a weak advanced guard across the Tai-tzu to construct a bridge-head at Hsin-cheng (N.E. of Liao-yang), the rest of the army remaining south of the Tai-tzu, whilst a renewed forward movement was being planned. The Lotatai position, too, would have been susceptible to a turning movement, as are, in fact, all positions. In the opinion of the authors, Kuropatkin should, assuming the necessity of defending the position actually chosen, have provided for an active defensive instead of guarding his flanks and rear with disproportionately large forces. The reserves were frittered away in reinforcing his passively-defensive line of battle by driblets, instead of acting offensively against the enemy's flanks. The absence of offensive spirit was likewise noticeable amongst subordinate Russian commanders. When Kuropatkin finally decided upon attacking, two courses are considered to have been open to him:—

1. To attack the exhausted enemy on the South bank of the Tai-tzu with his main force whilst warding off attacks from the North bank.
2. To fall with all available forces upon that portion of Kuroki's army which had crossed the Tai-tzu whilst holding the bridge-head at Liao-yang.

(1) Promised the greater results in case of success, but failure would have meant disaster. The plan adopted was akin to (2), and whilst promising less decisive results, kept a secure line of retreat open. In executing his plans Kuropatkin is held to have handicapped himself by opposing to Kuroki's force troops exhausted by previous fighting. The authors declare that on September 3rd there was still a chance of success for the Russians—a firm will was, however, required. The dispositions for retreat are praised, but their successful execution is ascribed largely to the exhaustion of the Japanese. The latter are considered to have entered upon the battle in an unfavourable position, owing to the concentric movements by which their armies had pursued the retreating Russian detachments whom they vainly endeavoured to destroy piece-meal. Nothing except a frontal attack remained since extensive movements to a flank were impossible so close to the hostile positions. It is questioned whether attempts at strategical out-flanking movements would have been feasible or advisable before the commencement of the advance on Liao-yang. Such manœuvres would have entailed changes of communications which were more or less precluded by the mountains, and by the fact that their adoption would have debarred the Japanese from utilising the Ying-kou branch railway. Regarding the battle, Nozu's failure to force the hostile centre is held to illustrate the difficulties of "wedge" attacks under modern conditions. Kuroki's employment of the Guard is criticised, but the tenacity with which he maintained the fight north of the Tai-tzu is appreciated.

Oyama's decision to keep back one and a-half divisions of the Ist Army when this army attacked the south bank of the Tai-tzu, with the idea of using them to molest the Russian retreat, is found fault with. In view of his numerical inferiority, all available forces should have been employed. The zone of the Ist Army should have been prolonged westward, and other portions of the Japanese line correspondingly altered, the 4th Division attempting to envelop the Russian right.

The necessity of an attack against the south of Liao-yang after the Ist Army had fought in vain for two days is doubted. A concentric attack from both flanks of the Tai-tzu by the Ist and IVth Armies would have obliged the Russians to face Kuroki with weaker forces. Meanwhile the IInd Army should have guarded against a Russian eruption southward from the Liao-yang defences and secured the flank of the IVth Army.

Officers studying these maps will find British official maps of great use in helping to identify places since the German spelling of Chinese names differs greatly from ours.

The Zaraisk Regiment at Lang-tzu-shan and the Sha Ho (Участіе Зарайцевъ въ бою при Ланьдзясанѣ, etc.). By E. I. Martinov. 121 pp. 8vo. St. Petersburg, 1908. General Staff Press.

The author commanded the Zaraisk Regiment in the actions of which he gives a short narrative. The pamphlet is written in an egotistical and personal strain.

A Soldier, Lieutenant Burtin (1874-1905) (Un soldat, Le Lieutenant Burtin (1874-1905). By Major de Fonclare. 260 pp., with a portrait and map. 8vo. Paris, 1908. Chapelot, 3/4.

It is not often that the biography of a subaltern is placed before the public. Lieut. Burtin, however, appears to have been quite an exceptional officer, whose character and short career are worthy of study and record.

The account of his service in the Alps, in the Vosges, and in Tunisia, is of interest, owing to his striking personality and on account of the valuable picture of French military and regimental life which is put before us. From our point of view, however, the most important part of the book is the description of the Russian troops and of the operations in Manchuria, which is contained in his letters, written to various brother officers in the French Army from the front. Lieut. Burtin, having obtained three years' leave of absence from France, joined the Russian Army in November, 1904, as subaltern of Cossacks, after experiencing considerable difficulty in obtaining this appointment. He was killed in his first engagement, during Gen. Mistchenko's famous raid on Newchwang and Yinkow. He was an officer of immense energy and great personal bravery, well read, extremely patriotic, and enthusiastically devoted to his profession.

A Military History of Perthshire, 1660-1902 (with a companion volume), A Military History of Perthshire, 1899-1902. Edited by the Marchioness of Tullibardine. 2 vols. 634 and 316 pp. 4to. With numerous illustrations. Perth, 1908. Hay. 1st Vol. 10/6, 2nd Vol. 21/-.

The larger of these two volumes consists of a series of articles, by the editor and others, describing the doings of the various bodies of troops raised in Perthshire for the Regular Army, 1660-1898, and for the Auxiliary Forces, 1660-1902.

It also describes the battles which have taken place in the county, and contains short biographies of men of action, naval as well as military, and a history of the part played by Perthshire in the Jacobite risings.

The smaller volume gives an account of the part taken by the Black Watch and Scottish Horse in the South African campaign, and a list of Perthshire men who have seen active service between 1893-1903.

Neither volume professes to be a continuous history, but both are most carefully compiled, and form a work of reference which will no doubt be appreciated by those interested in the county.

The History of the Second Dragoons "Royal Scots Greys." By E. Almack, F.S.A. 296 pp., with illustrations. 4to. London, 1908. Moring 42/-.

The services of the Scots Greys are well known, and this book gives an account of them with other details regarding uniform, arms, equipment, pay, etc.

The book is purely of regimental interest. It is very well printed and bound, and the illustrations are well reproduced.

A Short History of the Black Watch (Royal Highlanders), 1725-1907. 241 pp. 8vo. London, 1908. Blackwood. 5/-.

In Part I. is described the origin of the Black Watch and details regarding dress, regimental music, etc., and briefly the services rendered by the regiment up to 1907.

Part II. consists of a short record of the movements and engagements of the 2nd Battalion in the South African War from 1899 to 1902, and contains maps and sketches illustrating the same. The book is purely of regimental interest.

POLITICAL.

American Constitutions. By José Ignacio Rodriguez. 2 Vols. of 874 pp. in all. 8vo. Washington, 1905. Government Printing Office. 16/6.

This work has been published by the International Bureau of the American Republics, of which the author is the librarian and chief translator. It is a compilation of the political constitutions of the independent nations of the new world, with short historical notes and various appendices.

The English are Upon us! (Die Engländer kommen!). By Argus 39 pp. 8vo. Hamburg, 1908. C. H. A. Kloss. 4d.

The recent British Naval Manœuvres in the North Sea have inspired "Argus" with fears as to the potential dangers involved by the "close proximity," as he puts it, "of a not entirely friendly seapower to our richest and most important emporiums."

Whilst apparently engaged in peace manœuvres, Lord Charles Beresford's fleet make a sudden raid in the early hours of a June morning on Heligoland, Cuxhaven and Hamburg. Though the story has no special military value, and its probability is more than remote, it is told in a graphic and stirring manner.

Chinese Policy (La Politique Chinoise). By Albert Maybon. 365 pp., with genealogical table. 12mo. Paris, 1908. Giard and Briere. 3/4.

This useful work is divided into three parts. The first part deals with the Manchu Court; the second with "Reformers and Conservatives"; and the third with the revolutionary party and its attitude towards the Government. The book only pretends to deal with Chinese history during the decade 1898-1908, but the rise to power of the present Dowager Empress and of the several eminent men who have assisted her, is sketched from the beginning. The third part contains a chapter headed, "Three great popular manifestations," in which the boycott of American products, the protests arising out of the construction of the Han-K'ou—Canton Railway and the Mixed Court case at Shanghai are discussed.

An appendix deals with Christian missions in China, and describes the circumstances under which official status (recently withdrawn) was granted to the Roman Catholic hierarchy, besides giving statistics as to missions.

In Korea with Marquis Ito. By G. T. Ladd. 463 pp., with several photographs and appendices. 8vo. London, 1908. Longmans. 12/6.

The author is an American professor, well acquainted with Japan, who spent some months in Korea in 1907, as the guest of Marquis (now Prince) Ito, at the latter's invitation.

The book is divided into two parts, of which the first deals with the author's personal experiences. The second, is "A Critical and Historical Enquiry," and contains chapters on Korean history, the resources of the country, its system of justice and education and foreign relations, the alleged wrongs suffered by the Koreans at the hands of the Japanese, and the influence of missionaries.

Doctor Ladd is frankly and enthusiastically pro-Japanese, but his statements are based on the accounts of well-known personages or official and other public documents, the authorities being always quoted. The historical portion is clear and complete, and throws a lurid light on the corruption of the Korean ruling classes and the failings of the people. The author's criticisms on Japanese methods on page 217 and in other places are severe, and the book leaves the impression that a clear distinction must be made between the intentions of the Japanese governing powers, and the doings of some of their less reputable compatriots, which embarrass no one more than Prince Ito and his assistants.

The Little Jap will grow up! (Petit Jap deviendra grand!) By Léo Byram. With a preface by M. Jules Claretie, of the Académie Française. 390 pp. Illustrated. 8vo. Paris, 1908. Berger-Levrault. 3/-.

This work is partly an account of the author's recent experiences in Korea and Manchuria, and partly an attempt to forecast the future of Japan. It contains a brief *résumé* of the history of the Far East, and deals with the question of the emigration of Japanese to the American Continent and to Australia, whilst one chapter is devoted to the decline of French influence. It concludes with a description of the aims of Japanese policy.

The book will repay reading by those interested in the question, although it contains nothing strikingly new.

The Liberal Empire. Volume XIII. (L'empire libéral : études, récits, souvenirs. Tome XIII.) By Emile Olivier. 670 pp. 8vo. Paris, 1908. Garnier. 5/-.

This book, the 13th volume of the series which began to appear in 1895, deals with the politics and diplomacy immediately preceding the Franco-German War of 1870-71.

India. Parliamentary Blue Book, Cd. 4201. Papers regarding: I. Orakzais. II. Zakka Khel Afridis. III. Mohmands. 1908. 168 pp. 4to. 1/6.

Part I. deals with the request of certain Orakzai clans to be taken under British administration. A despatch from the Government of India sets forth the reasons for and against such an extension of our responsibilities as would be involved. A similar case in 1894 is quoted; and in conclusion the Secretary of State declares that H.M. Government adhere to the policy of non-interference laid down in 1898, and therefore decline to accede to this request.

Part II. begins with the settlement effected with the Khyber Pass Afridis in 1898; relates the various offences committed by the Zakka Khel. The Government of India advocate permanent occupation of the Bazar Valley, and ask sanction for an expedition for the purpose. The Secretary of State objects to a policy of occupation, and only sanctions the expedition, subject to a time limitation, and no occupation or annexation. Then follows the correspondence regarding the formation of the force, and the operations, and the Political Report on the expedition.

Part III. begins with the relations entered into with the Mohmands in 1896, as a result of the Durand Agreement. Then follow the events of April, 1908, which led up to the recent expedition; the serious situation in the Khyber at the beginning of May, the incursion by Afghans, and their dispersal; the formation of the Mohmand Field Force, its operations, and their successful conclusion.

Pangermanism (Le Pangermanisme). By Captain Coquelin de Lisle. 19 pp. 8vo. Paris, 1906. R. Chapelot. 5d.

The author states, at the commencement of this pamphlet, that there is no secret about the aims of Pangermanism. The German Emperor himself has revealed these aims to the world in terms by no means "sibylline." Certain significant utterances of William II.'s are then quoted. The author continues by showing how these Imperial dicta are elucidated by the history of the Hohenzollern family, which has attributed to itself a mission of gradually grouping all the branches of the German race under the hegemony of Prussia. A list of some of the most important societies for the propagation of these doctrines is given, and the work they are carrying on described, thus indicating, to some extent, the wide scope of this movement.

The States of Central Europe, which are gradually to be drawn into this immense German Confederacy, are dealt with in turn. The systematic methods of absorption are dealt with in each case, and the progress made in recent years is indicated.

The author does not deal with Pangermanic propaganda in South-eastern Europe and Asia Minor.

He pleads that what he has stated in this work is nothing more than an historical fact, which is gradually being evolved under our eyes.

Are we on the Verge of a Universal War? (Stehen wir vor einem Weltkrieg?). By Rudolf Martin. 145 pp. 8vo. Leipzig, 1908. Friedrich Engelmann. 2/-.

This is a book of the same style and nature as the remainder of the series emanating from the pen of the some author under the titles of "The Future of Germany," "The Conquest of the Air," "Emperor William II. and King Edward VII.," etc., and like its predecessors, deals with the question of the future command of the air for Germany, and the consequent downfall of Great Britain. The argument throughout is very involved and difficult to follow. Herr Rudolf Martin commences his romance with the statement that the real political aim of Germany should be to establish protectorates over Morocco and Turkey, and that if the end cannot be attained peaceably it must be fought for. Germany has, however, according to the author, no definite declared foreign policy at the present day, and it is this groping in the dark which constitutes the danger to the world's peace. But

war can be avoided if she will spend the necessary money, estimated by Herr Martin at £100,000,000, for the construction of some 100,000 air-ships, capable of transporting 350,000 men to the shores of Great Britain. The very fact of Germany being able to threaten in this way the head of the present great coalition of Powers against her must secure to her what she requires in Morocco and Turkey, and at the same time ensure the maintenance of peace.

According to the author, Germany would be quite satisfied with a division of Morocco between herself and France, Germany retaining the western half with the Atlantic seaboard and the Mediterranean coast line as far as Tangier, and France taking what remains.

After discussing, in the first seven chapters, the Morocco and Near Eastern questions, and the relations of France, Germany, Russia, and Austria to those questions, Herr Martin devotes the eighth and last chapter to surmises as to the probabilities of an immediate European conflagration, and the course it will take.

The visits of Sir John French and Sir J. Fisher to France and Russia indicate, according to the author, the existence of naval and military conventions between Great Britain and those countries. In the event of war, Germany will stand isolated against a gigantic coalition, in which even Austria, Italy, Spain, Portugal, and the Scandinavian States may be expected to take their place.

The first objectives will be Paris and St. Petersburg, and events leading to the occupation of the French and Belgian ports facing England are dismissed in half-a-dozen lines. It is then from Ostend, Calais, Dunkirk, and Cherbourg as bases that Germany's flotilla of air-ships will descend on British territory, and by breaking Great Britain's power, at the cost to the latter of an indemnity of £1,000,000,000, will so free herself from her enforced isolation, and be able to pursue a definite world policy unfettered.

It may be well to remark that Herr Martin's book was written before the unfortunate Count Zeppelin suffered the loss of the Zeppelin No. 4, in his attempt to perform the 24 hours' continuous flight, demanded by the German military authorities as a condition for the purchase of this machine and the Zeppelin No. 3, with their sheds, at a cost of £167,000.

NAVAL.

Fighting Ships, 1908. By F. T. Jane. 468 pp., with numerous diagrams. 4to. London, 1908. Sampson Low. 21/-.

This well-known publication has been brought up to date. The articles, of which Part II. consists, are mainly of interest to those concerned in naval construction.

The Naval Annual, 1908. By T. Brassey, A.I.N.A. 437 pp., with numerous plates and diagrams. 8vo. Portsmouth, 1908. Griffin. 10/6.

This year the *Naval Annual* is divided into four parts.

Part I. contains a review of last year's work in British and Foreign Navies with comparative strength and tables; and chapters on Foreign Naval Manœuvres, the armoured cruiser question, Marine Turbines, the *personnel* of the French Navy, the second Peace Conference and Naval Interests, the share of the Fleet in the defence of the Empire, and the Naval and Maritime Industries of Italy.

Part II., as before, contains lists of British and foreign ships with plans.

Part III. contains Armour and Ordnance Tables.

Part IV. contains the First Lord's Statement, the Navy Estimates, programme of shipbuilding and returns of gunlayers' tests and battle practice; the Navy Estimates of Austria-Hungary, France, Germany, Italy, Russia, and the United States; and Sir E. Grey's Instructions with Sir E. Fry's Report on the Hague Conference.

Among the Contributors are Admiral Sir Cyprian Bridge, Sir F. Pollock, and Mr. J. Leyland, and among these the attention of soldiers is specially drawn to Admiral Bridge's article on the share of the Fleet in the Defence of the Empire.

The volume fully sustains the high standard of its predecessors.

Nauticus, 1908. Annual of German Interests at Sea (Jahrbuch für Deutschlands Seeinteressen). By Nauticus. 659 pp. 22 photographs, 51 diagrams, and one map in pocket. Berlin, 1908. Mittler. 5/6.

This publication, which has been issued annually since 1898, is the equivalent of Brassey's *Naval Annual*.

It is divided into three parts:—

I. Political and Military.
II. Commercial and Technical.
III. Statistical.

It is a very comprehensive work, and contains information of all kinds concerning the fleets of Germany and the other Great Powers.

CAVALRY.

Training of Cavalry for War. Part I.: Training of the Squadron, with special reference to non-commissioned officers and men (Ausbildung

der Kavallerie im Felddienst. Erster Teil: Ausbildung der Eskadron, Insbesondere für Unteroffiziere und Mannschaften). By Lieut.-Col. Wenninger and Capt. von Bressensdorf. 133 pp., with 11 diagrams in the text. 8vo. Berlin, 1908. Mittler. 1/-.

A useful little book enunciating the duties of cavalry with special reference to those portions of the new Field Service Regulations of 1908 which apply to the arm.

The object of the authors has been the preparation of an aid to cavalry officers, in a progressive form, for the instructions of their non-commissioned officers and men. An endeavour has been made to set forth, in the simplest language, the general principles of the employment of army and divisional cavalry, showing the distinction between their several duties; the lines on which reconnaissance and screening are carried out, the principles of distant, close, and tactical reconnaissance, and the difference between the methods of transmission of information in the case of distant and close patrols.

The book is set up in two kinds of type, the larger containing the general matter for the instruction of the rank and file, and the smaller, the more detailed instruction for the non-commissioned officers.

The book concludes with a *résumé* of some of the more important instructions contained in the new Manœuvre Regulations of 1908, which are applicable to cavalry.

Training of Cavalry for War. Part II.: Training of Officers and Squadrons (Ausbildung der Kavallerie im Felddienst. Zweiter Teil: Ausbildung der Offiziere und der Eskadrons). By Lieut.-Col. Wenninger, 1st Bavarian Heavy Cavalry. 118 pp., with two diagrams in text. 8vo. Berlin, 1908. Mittler. 1/6.

The matter contained in this volume is supplementary to the more elementary instruction contained in Part I. Based, similarly to that volume, on the new Field Service Regulations, its *raison d'être* is to form a guide to cavalry officers with reference to the higher duties of cavalry. The book is divided into two distinct parts, the first dealing entirely with the duties of army cavalry, and the second with those of divisional cavalry.

Under the heading army cavalry, the systematic training of officers as leaders of distant patrols and reconnoitring squadrons is entered into, commencing with academic exercises with the aid of maps and plans, and concluding with tactical rides in the open country. Exercises in reconnaissance and screening are also dealt with. Numerous examples are given dealing with various situations. The part devoted to the duties of divisional cavalry discusses the duties of subalterns in leading close and combat patrols, in close and in tactical reconnaissance, and in pursuit.

Examples are given at the end for the guidance of regimental commanders in examining their officers in the above duties, and for setting tactical exercises.

ARTILLERY.

Artillery Scouts (Manuel d'instruction théorique et pratique pour la formation des éclaireurs d'un groupe d'artillerie). By Major H. Nicolas, French Artillery (Brigade Commander, 40th Regiment of Artillery). 50 pp., with numerous diagrams. 8vo. Paris, 1908. Berger-Levrault. 1/-.

A handy little booklet, with useful hints and instructions for the guidance of artillery scouts.

Lessons of Artillery. Volume I.—Matériel. Volume II.—Laying and Firing (Leçons d'Artillerie. 1ère Partie.—Matériel. 2ième Partie.—Pointage et tir). By Capt. Alvin, Artillery Professor at the French Military School of Artillery and Engineering (Versailles). 550 pp., with numerous diagrams. 8vo. Paris, 1908. Chapelot. 8/- for the two volumes.

This work may be considered as a modern edition of the books of Girardon (1896) and Lagabbe (1903), which it amplifies and brings up to date. Girardon and Lagabbe were, like Alvin, Professors of Artillery at the School of Versailles, and the contents of their books may be looked on as a *résumé* of the lectures delivered by them at this school.

The author deals with the principles of artillery construction rather than with descriptions of intricate details, and does not touch on the subject of small arms. Both volumes begin with a sketch of the historical development of the guns and their ballistic properties, with special reference to the French artillery, as is only natural.

The work has been compiled with great care and thoroughness, and its study can hardly fail to be interesting and profitable to all artillery officers. Volume II. contains valuable remarks on French artillery tactics, with special reference to the necessity of rapidity in coming into action, and the importance of good observation posts. Gen. H. Rohne deals with the book at length in *Militär-Wochenblatt*, No. 75, of 18th June, 1908.

Instructions for the Construction of Targets for Field and Fortress Artillery (Zielbau-Vorschrift für Feldund Fussartillerie, 10th April, 1908). Official. 140 pp., with numerous diagrams. 8vo. Berlin, 1908. Mittler 1/-.

This official publication considers the subject under the main headings of targets in the field, targets for siege operations, and the representation of fire, effect of both gun and rifle, from targets. Under the heading "Targets in the Field," the construction of dummies, and the representation of infantry, machine gun, field and heavy artillery targets, fixed, disappearing, and moving, are entered into. Under "Targets for Siege Operations," wall and armoured targets are dealt with. The various contrivances for representing the effect of gun and rifle fire from the target are thoroughly described under the last main heading. All the diagrams are good, clear, and instructive.

Q.F. Artillery (L'artillerie de campagne à tir rapide. Etat actuel de la question). By Major Bornecque. 157 pp. 8vo. Paris, 1908. Chapelot. 2/6.

A brief summary of the properties of modern field artillery, followed by a description of the *matériel* in use in the various countries of the globe, with remarks and criticisms.

The Study of Arms (Waffenlehre). By Maj.-Gen. R. Wille. 2nd supplement in 3 volumes. Volume I., 102 pp. Volume II., 57 pp. Vol. III., 102 pp. 8vo. Berlin, 1908. 16/6.

These three volumes are a survey of the present condition of artillery *matériel* in the principal armies of the world.

Part I. commences with a general review of the subject, particular attention being devoted to light field howitzers and to the relative advantages of 4 and 6-gun batteries. As regards the future, the author expects a great development in the manufacture of shells and fuzes. The new Swedish explosive, Holmgrens, is cited as an example of the possibilities in this direction. Guns mounted on motor carriages may shortly make their appearance in the field.

Dealing with the several countries, special chapters are devoted to:—

Volume I.—Germany, Belgium, Bulgaria, China, Great Britain, France, and Greece. Volume II.—Italy, Japan, Mexico, Netherlands, Norway, Austria-Hungary, Persia, and Portugal. Volume III.—Roumania, Prussia, Sweden, Servia, Spain, Turkey, and United States.

As regards the British 18-pr. field gun, the author strongly criticises the opinion, expressed in a British military journal, that this equipment is the "best in the world." He considers that the weight of the gun, and the small number of rounds carried, are defects hardly compensated for by the increased size of the projectile. The exposure of the buffer cylinder on the top of the gun is considered as another serious blemish.

STRATEGICAL AND TACTICAL.

The Employment of Mounted Infantry with Cavalry to the Front of an Army (L'infanterie montée avec la cavalerie en avant des armées). By Capt. Besset, 49th Infantry Regiment. 60 pp., with diagrams. 8vo. Paris, 1908. Chapelot. 1/-.

Capt. Besset wishes to use mounted infantry in support of cavalry, without giving them valuable horses, which might be more profitably employed for cavalry or artillery. His aim is to find a secure and reliable means of transport by which infantry can be rapidly moved from place to place, and he comes to the conclusion that neither vehicles, small ponies nor bicycles afford a satisfactory solution of the problem. He then propounds a scheme for utilising Algerian mules for the purpose; he claims that these animals have the necessary qualities of speed and endurance, whilst there would be little difficulty in obtaining them in sufficient numbers.

Machine Guns. Their Employment, more especially from a Tactical Point of View, in Co-operation with the other Arms (Les mitrailleuses. Divers cas d'emploi, et notamment au point de vue tactique en liaison avec les autres armes). By Major J. Godts, Belgian General Staff. 155 pp. 8vo. Laeken, 1908. Imprimerie, Lithographic Emile Godts, 1, Rue Albert. 2/1.

This book has been compiled from a series of lectures, delivered at Brussels this year. It deals with the history of machine guns, their powers and limitations, and shows the tactical methods adopted by different armies in their employment. The author discusses the action of machine guns in co-operation with the other arms of the service; his views on this question are sound and interesting, and in general agreement with those prevailing in this country. He has made an exhaustive study of the subject, and has produced a readable and useful volume.

Tactics (Taktik). Vol. I. By von Balck, 4th edition, 420 pp., with numerous plates and diagrams, and an index. 8vo. Berlin, 1908. Eisenschmidt. 8/6.

The author's views are founded avowedly on the German regulations, but the latter are compared at every step with those of other countries, especially of Russia and Japan.

The first chapters deal with minor tactics, equipment, and the effect of fire arms, with comparative tables from various countries. The remainder consists of tactical treatises, similar to those in von Löbell's Jahresberichte for 1907, the resemblance of language in many cases suggesting a common authorship.

The following is a summary of the author's views on some of the points touched upon.

The moral endurance of troops has diminished. Losses of one-third, or even one-fourth, will no longer be endured. The close fighting, which formerly resulted in such heavy losses, has grown rarer. But individual units may be exposed to losses quite as severe as in former wars.

Formation in depth is still indispensable, and increases in proportion with the numbers engaged.

The average number of rifles required per 1,100 yards of front are estimated at:—For passive defence, 820 rifles or ·8 rifle per metre. For active defence, allowing for 20 per cent. casualties and a reserve of one-third, 2,400 rifles or 2·4 rifles per metre. For the attack, allowing for 50 per cent. casualties and a reserve of 2,000, 4,200 rifles or 4·2 rifles per metre (pp. 203, 204).

Close reconnaissance on the battle-field is indispensable to avoid the danger of surprise by fire at close ranges; reconnaissance in force will often be necessary. The formation of special units for the work of reconnaissance is suggested.

Machine guns are essentially a reserve of fire; it is a waste of their mobility to commit them to prolonged fire fighting. In the attack they may be pushed forward at the outset, and subsequently withdrawn. In the defence their normal position is with the reserve, whence they may be detached to threatened points. The fire of a machine gun is equal to 50—60 rifles.

The advance of infantry through their own artillery should take place at successive points, so as not to interrupt the fire too long in any one portion. Infantry must study the formations which make ranging most difficult for the enemy's guns. Small columns, on a narrow front, with wide intervals, are the best. (Diagrams pp. 275, 277.) The attack of shielded artillery by infantry fire will seldom be worth attempting.

The battle of encounter being in the nature of a surprise, the commander must at once seek to gain the initiative, by offensive action. *In every battle of encounter* after the first contact a pause ensues; it is then that the commander must decide whether he will pursue the initiative he has gained or break off the attack.

The Japanese attacks, up to the battle of Wa-fang-kou, were on the approved German model, but after that battle the superiority of the Russian artillery led to modifications in form, especially as regards depth and extension. The first step in the attack must be to feel the enemy's front all along with advanced troops, supported by artillery. Meanwhile the army moves up to a preparatory position; with large forces this period may extend over several days. The infantry can no longer await the issue of the artillery duel; the danger, indeed, arises that the infantry may push home the attack before superiority of fire is gained.

Flank attacks are preferable to frontal, but some element of surprise is almost essential for their success, and this can only be obtained if the holding attack is energetic. Envelopment is easier when it follows naturally from the converging advance of two separate forces, than when it is developed from a formation in depth. The necessity for the assault is insisted on; a position can never be won by fire alone; but fire superiority must be gained before the assault is delivered.

Entrenching in the attack is viewed with disfavour by the author, as tending to diminish the offensive ardour of the troops.

The Russians in Manchuria used advanced positions, defending them obstinately against superior numbers, with the result that the main position had often to be abandoned without fighting. In France and England advanced positions are much favoured, but rather to mislead the enemy, and to afford opportunities for counter-strokes.

The difficulty of executing the counterstroke lies in the choice of the moment for launching it; it cannot be foretold how long the enemy will take to get within striking distance. The reserve can, however, be moved gradually towards the position as the enemy gets nearer. The commander will need great strength of character to refuse appeals for reinforcements as the crisis of the battle approaches. As regards *direction*, frontal counter-attacks appear hopeless in theory, but the experience of war shows that they are often successful.

The following tables, etc., are of interest, pp. 51—63, infantry formations in various countries; pp. 68, 106, 113, 147, 232, tables showing effect of fire; p. 159, trajectories and shape of ground; p. 162, casualties; pp. 184—189, deployment of infantry; pp. 236—246, machine gun equipment and formations. pp. 362—3, trenches and profiles; p. 410, ammunition supply.

The Line of the Glommen (Glommen-Linien). By Col. G. Stang. 64 pp., with 1 map. 12mo. Christiania, 1908. Aschehoug. 1/d.

This book is a posthumous work by the late Col. Stang, with a preface by Colonel Lowzow, the Norwegian Defence Minister. By the Karlstad Convention in 1905, a neutral zone was established between Sweden and Norway, the latter country agreeing to demolish the fortifications she had constructed along the old frontier line. Col. Stang considers that the convention is an insufficient guarantee of

security, and, in view of the exposed position of Christiania, he advocates the construction of a fresh line of forts along the River Glommen, which flows roughly parallel to, and a few miles west of the neutral zone.

The lower portion of the Glommen, from Sarpsborg to Fredrikstad, is, in the author's opinion, the strongest by nature. The works in this portion would have a purely defensive character. To north of this section the river makes a wide curve to the west, from Grönsund to the south end of the Ojeren Lake. This, he considers, is the weakest part of the line, and at the same time the most important, because the most direct route to Christiania crosses this portion of the river. The works proposed in this section are to have the character of a "bridge head," with a view to offensive action against an enemy advancing against the northern or southern portions of the line.

Towards the north of the neutral zone, the Convention prohibits any extension of the fortifications of Kongsvinger. It is therefore considered necessary to supplement this fortress by an additional work at Skarnaes, on the borders of the neutral territory.

The Relations between France and Siam (*1680-1907*) (Les relations de la France et du Siam (1680-1907)). By Capt. Seauve. 120 pp., with 27 photographs and 3 maps. 8vo. Paris, 1908. Lavauzelle. 2/6.

This work first appeared in the form of a series of articles in the *Revue des Troupes Coloniales*. It is a complete account of the dealings of France with Siam since 1680 and up to the conclusion of the treaty of March 23rd, 1907, showing the various phases through which the relations between the two countries have passed. The author looks upon the situation as definitely settled, now that Siam has obtained recognition as a civilised state, and now that France has got a boundary which she considers satisfactory.

The Decisive Blow (Le coup de massue). By Dr. J. Auboeuf, with a preface by Paul Déroulède. 192 pp., with 4 diagrams. 8vo. Paris, 1907. Lavauzelle. 2/6.

This is an interesting discussion of the prospects of a war between France and Germany, which the author seems to regard as inevitable. He believes that the two nations will be left to fight out the campaign by themselves; though he has a high opinion of the fighting value of the British troops, he considers their numbers to be too insignificant and their organisation too defective for them to be capable of exercising any real influence on the great struggle between France and Germany. He looks upon the violation of Belgian territory as highly probable, almost certain, in fact, but does not think that the Belgian Army will be able or willing to offer any serious resistance.

The book is carefully and ably written, and is worth reading. The comparison between the French and German Armies, shows a partiality to the former, and the author's conclusions may therefore be somewhat optimistic. At the end of the volume, however, Dr. Auboeuf confesses that the question of *moral* is all-important, and that without confidence and self-reliance France will again be crushed. His object is to show Frenchmen that their prospects of defeating Germany are extremely hopeful, and that, provided their *moral* is equal or superior to that of their enemies, they should now be in a position to avenge Sedan and march to a new Jena.

TRAINING AND EDUCATION.

Field Telephones for Army use, with an Elementary Course in Electricity and Magnetism. By Lieut. E. J. Stevens, R.A. 110 pp., with illustrations. 8vo. London, 1908. Crosby Lockwood. 12/-.

The explanation of the principles of electricity and magnetism is simple, though not always quite accurate. No explanation is given of the method of testing a battery with detector.

Little detail is given about line work. Three of the Service field telephones are fully described—the new C. Mk. II. is not described at all. The action of the vibrator call (called a buzzer) is very inadequately explained.

No mention is made of the necessity for separating earths at a point where several telephones are in use to avoid cross-talk.

On the whole, a useful little book, though the system of stringing hints together in the "Summaries" is confusing. The index is somewhat inadequate.

The Advantages of Military Training (Les avantages du militarisme au point de vue économique et social). By Lieut. Jean Montagne. 214 pp. 8vo. Paris, 1908. Berger-Levrault. 2/-.

The object of this book is to combat the growth of anti-militarism, which has of late years assumed somewhat alarming proportions in France, tending, indeed, to undermine the national security of the country. Thanks to the strenuous efforts of the officer class and other patriotic Frenchmen, the popularity of this propaganda now appears to be on the wane. The author is of opinion that so-called militarism, or rather a love of duty to one's country, is a good thing for a people; his contribution to the literature dealing with the subject is thoughtful and interesting.

Military Law; its Procedure and Practice. By Lieut.-Col. S. C. Pratt. 17th edition, revised and corrected up to date. 281 pp. 8vo. London, 1908. Kegan Paul. 4/6.

A new edition of this well-known handbook.

Instructions for General Staff Tours (Bestimmungen über Generalstabsreisen, 14th April, 1908). Official. 26 pp. 8vo. Berlin, 1908. Mittler. 6d.

These offical instructions set forth what staff tours, such as those of the Great General Staff, Army Corps General Staffs, Fortress General Staffs, and Administrative Staffs, are to take place annually; how the officers are to be mounted (horses or bicycles), and how the cost is borne. The manner of conducting the various staff tours is then entered into; this includes the period for which the tour is to last, the officers who are to take part, and the question of allowances.

Manual of Infantry Instruction for Reserve Officers (Manuel d'Infanterie à l'usage des candidats élèves-officiers de réserve). 230 pp., with diagrams. 8vo. Paris, 1907. Charles-Lavauzelle. 1/-.

This manual has been compiled with a view to assisting young reserve officers to pass their examinations. The regulations bearing on the subjects for examination, have been collected in this work, which omits all those not forming part of the curriculum.

Drill Regulations and Outlines of First Aid for the Hospital Corps, U.S.A. Revised, 1908. 165 pp., with numerous illustrations in text. 8vo. Washington, Government Printing Office. 1908. 10/6.

This is the official manual for the training of men of the United States Army Hospital Corps in field exercises, and must not be confounded with the bulky Handbook for the Hospital Corps, prepared by Major Mason, and published unofficially, although the latter contains most of the information given in the official drill regulations. It is a small and handy pocket volume, covering much the same ground and in much the same way as the manual for the training of the R.A.M.C. In some respects, it goes further, and gives some useful exercises for loading and unloading patients on and from ships. The tent drill also includes new matter, such as special drills for pitching shelter and double shelter tents. The illustrations are clear and useful.

The Officer's Patrol (Die Offizier-Patrouille). By von Kleist. Revised by Major von Ruffer. 130 pp., with 1 map and 1 diagram. 8vo. Berlin, 1908. Mittler. 2/6.

This book, the original edition of which, by von Kleist, appeared in 1887, has been revised and brought up to date by Major von Ruffer, so as to be in accord with the instructions laid down in the 1908 edition of the German Field Service Regulations.

The chief innovations are with regard to the new message form, recently introduced into the German Army, and to the use of technical means for the transmission of information gained by patrols.

FORTIFICATION AND MILITARY ENGINEERING.

Technical Instruction for the Austro-Hungarian Pioneer Troops. Part 8. Bridging material and bridging train (Technischer Unterricht für die k. u. k. Pioniertruppe. 8. Teil. Kriegsbrückenmaterial und Train). Official publication. 84 pp., with 13 plates bound up separately. 8vo. Vienna, 1908. k. k. Hof und Staatsdruckerei. 2/6, including plates.

This book contains a detailed description of the Austro-Hungarian pontoon equipment and of the vehicles of the pontoon train. The excellent diagrams add much to its value.

Permanent Fortification at the Present Day (La fortification permanente contemporaine). By Major V. Deguise, Professor of Fortification at the Belgian School of Artillery and Engineering. 250 pp., with an atlas containing numerous plates and diagrams. 8vo. Brussels, 1908. Joseph Polleunis. 16/-.

This volume deals with the progress realised and the improvements attained in the art of permanent fortification in recent years, especially since the siege of Port Arthur. The author has the advantage of considerable experience, and this, together with the great pains which he has taken, has resulted in the production of a most useful work—clear, thorough, and complete. The book is highly valued in France, and has been well reviewed by French military journals.

AERIAL NAVIGATION.

The Employment of Captive and Free Balloons and Air-ships for Military Purposes (Fesselballon, Freiballon und Motorluftschiff in ihrer militärischen Verwendung). From the "Vierteljahrshefte für Trüppenführung und Heereskunde, 1908, Volume III." By Major Sperling, attached to the Prussian Balloon Battalion. 24 pp., with 2 diagrams in text and 5 maps. 8vo. Berlin, 1908. Mittler.

The author gives a general sketch as to the employment of the three forms of aerial conveyance in war. He holds that the experience gained in the use of captive and free balloons at manœuvres is, for all practical purposes, equal to that to be gained under service conditions, but he admits that his ideas, as to the employment of airships, are drawn from mere conjecture.

The *rôle* of captive balloons is reconnaissance, both near and tactical; free balloons and air-ships can combine the maintenance of communication with reconnaissance duty, which, in their case, will be distant and strategical.

The height to which a captive balloon can rise depends on the atmospheric conditions and the weight of the rope. The kite-shaped balloon, as used on the Continent, is more easily manipulated and is steadier in a high wind than its spherical British prototype; reconnaissance therefrom is consequently facilitated. The higher the captive balloon rises the less the eye of the observer has to penetrate the vapour, which clings to the earth's surface to a height of 500 metres. A diagram is given to demonstrate this.

Except in cases of urgency, captive balloons must never ascend within range of artillery fire; there is no danger, in the author's opinion, from rifle fire. Information is easily and rapidly transmitted by telephone from the balloon to the ground.

The control of free balloons is only possible, so long as the ballast carried lasts, by ascending or descending so as to catch favourable currents of air. The air-ship is capable of absolutely controlled movement by reason of its motor power and steering planes. Communication from these types of aerial conveyance can only be satisfactorily carried out with wireless installations, or, in the case of air-ships, by returning to earth.

The writer goes on to say that the use of air-ships by two opposing forces must result in an engagement between the dirigibles in the air. The victory will remain with the air-ship which can ascend to the greatest height, and so destroy the other by showering explosives upon it.

He paints a picture of how air-ships may be employed in naval warfare. In reconnaissance they will precede the cruiser scouts, in the fight they can assist by destroying the enemy's ships with explosives, and could be used to tow heavily-charged torpedoes through the water, in order to make more sure of hitting the objective. Their assistance in helping to raise the blockade of a port will be valuable.

Four examples of the use of captive balloons at different manœuvres, with details of information supplied by them, are given.

The article is instructive and worthy of study.

The Problem of Aviation. Its Solution by Means of the Aeroplane (Le problème de l'aviation. Sa solution par l'aéroplane). By M. Armengaud. 93 pp., with diagrams and illustrations. 8vo. Paris, 1908. Librairie Ch. Delagrave. 2/6.

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" E. M. Birch, D.S.O., Royal Field Artillery.
" P. W. Game, Royal Horse Artillery.
" and Brevet-Major C. B. Thompson, Royal Engineers.
" R. Ommanney, Royal Engineers.
Lieut. G. P. Dawnay, M.V.O., D.S.O., Coldstream Guards.
Capt. W. Drysdale, Royal Scots.
" G. H. B. Freeth, D.S.O., Lancashire Fusiliers.
" R. S. Allen, Lancashire Fusiliers.
" B. H. Chetwynd-Stapylton, Cheshire Regiment.
" A. Crookenden, Cheshire Regiment.
" and Brevet-Major I. Stewart, Scottish Rifles.
Lieut. H. Needham, Gloucestershire Regiment.
Capt. E. R. Clayton, Oxfordshire Light Infantry.
Capt. J. C. H. Newman, Essex Regiment.
" L. A. E. Price-Davies, V.C., D.S.O., King's Royal Rifle Corps.
" W. E. Davies, Rifle Brigade.
" L. R. Vaughan, Indian Army.
" J. Brough, Royal Marine Artillery.

And the following Officers received nominations:

Capt. the Hon. C. H. C. Guest, 1st Dragoons.
" and Brevet-Major E. D. Lord Loch, M.V.O., D.S.O., Grenadier Guards.
" R. H. Mangles, D.S.O., Royal West Surrey Regiment.
" H. W. Grubb, Border Regiment.
" G. N. Cory, D.S.O., Royal Dublin Fusiliers.
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27th	...	H. W. Crippin	6,411
32nd	...	L. H. King-Harman ...	6,372
35th	...	R. B. Pargiter	6,339

This is the second time in two years we have passed **three** out of the first **six** for Woolwich.

SANDHURST.

12th	...	C. W. Maxwell	5,172
13th	...	R. C. Money	5,169
27th	...	C. T. Ellison	4,912
38th	...	B. C. H. Keenlyside ...	4,644

CAVALRY.

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